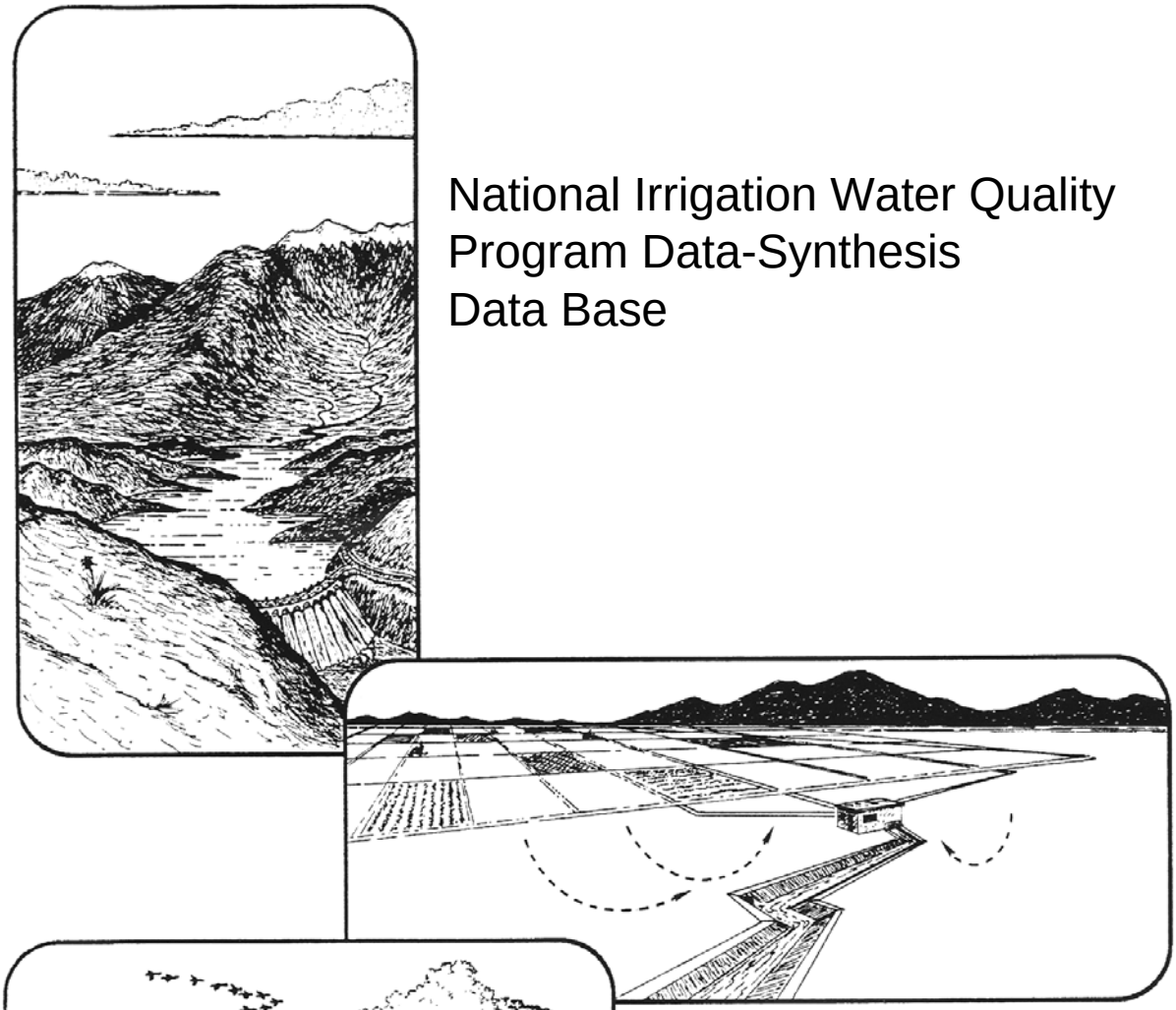

National Irrigation Water Quality Program Data-Synthesis Data Base

U.S. GEOLOGICAL SURVEY
Open-File Report 00–513

U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF RECLAMATION
BUREAU OF INDIAN AFFAIRS

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By Ralph L. Seiler and Joseph P. Skorupa

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Prepared in cooperation:
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Carson City, Nevada
2001

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Denver, CO 80225–0286

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CONVERSION FACTORS, WATER-QUALITY UNITS, AND VERTICAL DATUM

Multiply	By	To obtain
acre	4,047	square meter
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
foot (ft)	0.3048	meter
inch (in.)	25.4	millimeter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
ton per day (t/d)	0.9072	megagram per day

Water-quality units used in this report:

g/kg	gram per kilogram	mg/kg	milligram per kilogram
µg/g	microgram per gram	mg/L	milligram per liter
µg/kg	microgram per kilogram	mm	millimeter
µg/L	microgram per liter	mV	millivolt
µS/cm	microsiemen per centimeter	pCi/L	picocuries per liter

Temperature: Degrees Celsius (^oC) can be converted to degrees Fahrenheit (^oF) by using the formula $^oF = [1.8(^oC)]+32$.

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929, formerly called "Sea-Level Datum of 1929"), which is derived from a general adjustment of the first-order leveling networks of the United States and Canada.

National Irrigation Water Quality Program Data-Synthesis Data Base

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ABSTRACT

Under the National Irrigation Water Quality Program (NIWQP) of the U.S. Department of the Interior, researchers investigated contamination caused by irrigation drainage in 26 areas in the Western United States from 1986 to 1993. From 1992 to 1995, a comprehensive relational data base was built to organize data collected during the 26-area investigations. The data base provided the basis for analysis and synthesis of these data to identify common features of contaminated areas and hence dominant biologic, geologic, climatic, chemical, and physiographic factors that have resulted in contamination of water and biota in irrigated areas in the Western United States.

Included in the data base are geologic, hydrologic, climatological, chemical, and cultural data that describe the 26 study areas in 14 Western States. The data base contains information on 1,264 sites from which water and bottom sediment were collected. It also contains chemical data from 6,903 analyses of surface water, 914 analyses of ground water, 707 analyses of inorganic constituents in bottom sediments, 223 analyses of organochlorine pesticides in bottom sediments, 8,217 analyses of inorganic constituents in biota, and 1,088 analyses for organic constituents in biota.

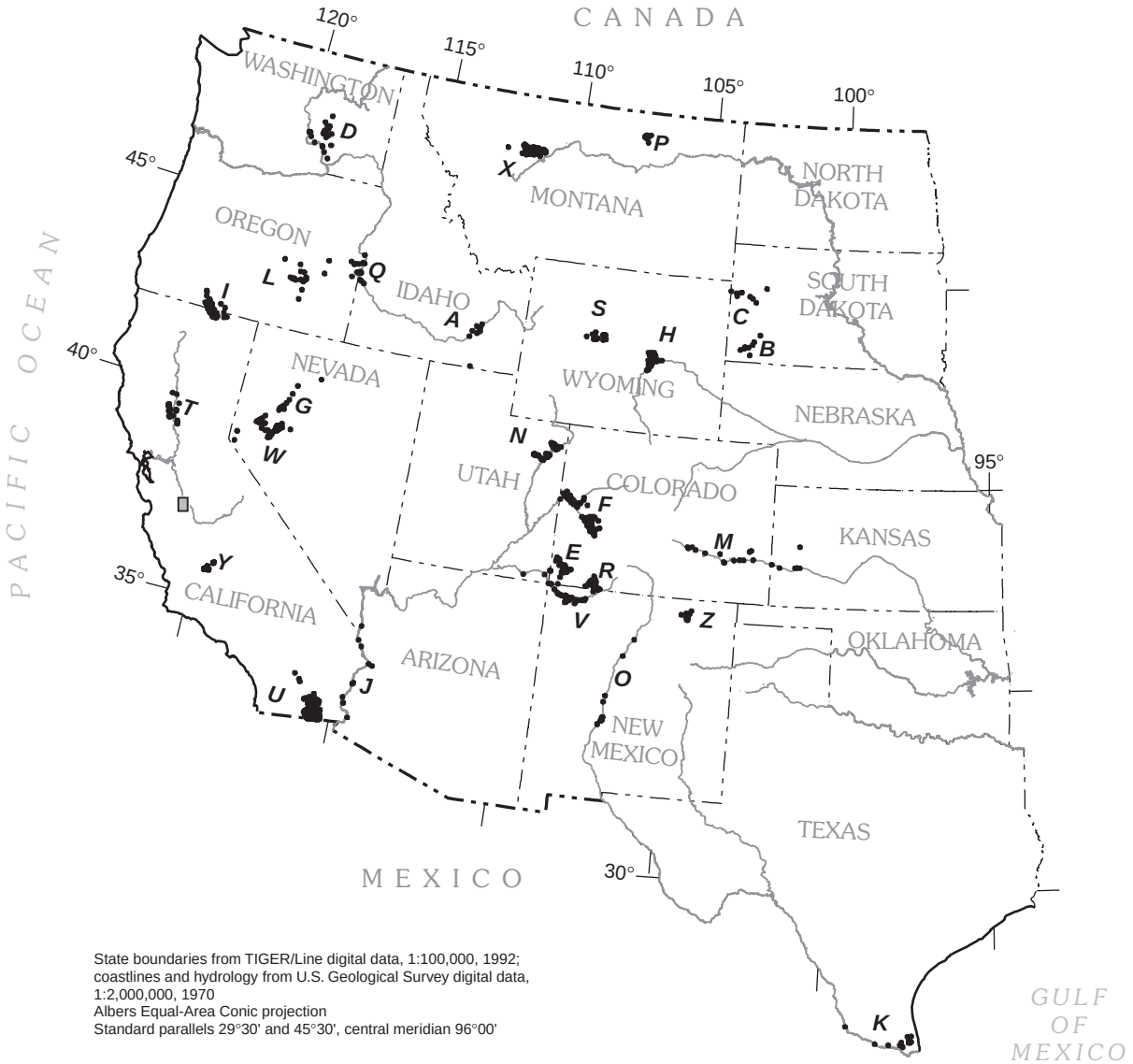
The data base is available to the public and can be obtained at the NIWQP homepage <http://www.usbr.gov/niwqp> as dBase III tables for personal-computer systems or as American Standard Code for Information Exchange structured query language (SQL) command and data files for SQL data bases.

INTRODUCTION

In the early 1980's, national headlines announced that selenium carried by irrigation drain water was causing mortality, congenital deformities, and reproductive failure in waterfowl at Kesterson National Wildlife Refuge, western San Joaquin Valley, Calif. The National Irrigation Water Quality Program (NIWQP) of the U.S. Department of the Interior (DOI) was created in October 1985 after the U.S. Congress and environmental groups expressed concern that irrigation-induced contamination of water and biota might occur elsewhere in the Western United States. From 1986 to 1993, 26 areas in the Western United States (fig. 1, table 1) were investigated to determine the existence, magnitude, and causes of contamination related to irrigation drainage in these areas.

Preliminary analysis of results from the NIWQP studies showed that many of the sites that exhibit irrigation-induced water-quality problems have common geologic, hydrologic, and climatic characteristics (Sylvester and others, 1988). The National Research Council reviewed the NIWQP (National Research Council, 1991) and suggested the need for systems analysis to identify and address the linkages among these characteristics.

In 1992, the DOI began a 5-year data-synthesis project to assess data collected by the completed and ongoing NIWQP investigations. The overall objective of the data-synthesis project was to identify commonalities of the 26 NIWQP study areas and dominant biologic, geologic, climatic, chemical, and physiographic factors that result in contamination of water and biota in irrigated areas of the Western United States. A key step in the data-synthesis project was the construction of a relational data base to organize the data collected during the NIWQP investigations.



EXPLANATION

T • **Data-collection site for National Irrigation Water Quality Program study area**—Letter is area identifier (table 1)

Kesterson National Wildlife Refuge, San Joaquin Valley, Calif.

Figure 1. National Irrigation Water Quality Program study areas and data-collection sites.

TABLE 1. Reconnaissance and detailed area studies used as data sources for National Irrigation Water Quality Program (NIWQP) data base

[—, no reference]

NIWQP study area		References	
Identifier[1]	Name	Reconnaissance studies	Detailed studies
Reports describing specific NIWQP study areas			
A	American Falls Reservoir, Idaho	Low and Mullins, 1990	—
B	Angostura Reclamation Unit, South Dakota	Greene and others, 1990	—
C	Belle Fourche Reclamation Project, South Dakota	Roddy and others, 1991	—
D	Columbia River Basin, Washington	Embry and Block, 1995	—
E	Dolores–Ute Mountain area, Colorado	Butler and others, 1995	—
F	Gunnison River Basin–Grand Valley Project, Colorado	Butler and others, 1991	Butler and others, 1994.
G	Humboldt River area, Nevada	Seiler and others, 1993	—
H	Kendrick Reclamation Project, Wyoming	Peterson and others, 1988	See, Naftz, and others, 1992; See, Peterson, and Ramirez, 1992.
I	Klamath Basin Refuge Complex, California-Oregon	Sorenson and Schwarzbach, 1991	MacCoy, 1994.
J	Lower Colorado River valley, California-Arizona	Radtke and others, 1988	—
K	Lower Rio Grande valley, Texas	Wells and others, 1988	—
L	Malheur National Wildlife Refuge, Oregon	Rinella and Schuler, 1992	—
M	Middle Arkansas River Basin, Colorado–Kansas	Mueller and others, 1991	—
N	Middle Green River Basin, Utah	Stephens and others, 1988	Peltz and Waddell, 1991; Stephens and others, 1992.
O	Middle Rio Grande, New Mexico	Ong and others, 1992	—
P	Milk River Basin, Montana	Lambing and others, 1988	—
Q	Owyhee-Vale Reclamation Project areas, Oregon–Idaho	Rinella and others, 1994	—
R	Pine River area, Colorado	Butler and others, 1993	—
S	Riverton Reclamation Project, Wyoming	Peterson and others, 1991	—
T	Sacramento Refuge Complex, California	Dileanis and others, 1992	—
U	Salton Sea area, California	Setmire and others, 1990	Schroeder and others, 1993.
V	San Juan River area, New Mexico	Blanchard and others, 1993	—
W	Stillwater Wildlife Management Area, Nevada	Hoffman and others, 1990	Rowe and others, 1991; Lico, 1992; Hallock and Hallock, 1993; Hoffman, 1994.
X	Sun River area, Montana	Knapton and others, 1988	Lambing and others, 1994.
Y	Tulare Lake Bed area, California	Schroeder and others, 1988	—
Z	Vermejo Project area, New Mexico	Bartolino and others, 1996	—
Reports describing multiple NIWQP study areas			
H, J, K, N, P, U, W, X, Z	([2])	Severson and others, 1987	—
A, B, C, F, I, L, M, O, S, T	([2])	Harms and others, 1990	—
C, E, G, Q, R, U, V, W	([2])	Stewart and others, 1992	—

[1]Used in figure 1 to show locations of study areas.

[2]See above list for specific area names corresponding to these identifiers.

The Ingres data-base management system (hereafter referred to as Ingres data base) was chosen because it is relational and uses the American National Standards Institute (ANSI) standard structured query language (SQL).

The NIWQP data base has been made available for scientists using different types of computer systems. SQL was chosen to disseminate the data base because applications written in SQL are portable to many hardware platforms and will be for many years to come. The NIWQP data base also is available to individuals using personal-computer (PC) data-base management systems that may or may not support SQL. Although the data-synthesis team did not use dBase III for data analysis, dBase III files were chosen to disseminate the data base because most PC data-base management systems can read dBase III files, and because utilities were available to create the dBase III files.

PURPOSE AND SCOPE

This report describes the structure and content of the NIWQP data base, provides a data dictionary and describes how the data base was built and quality assured. The report does not include an analysis of the data contained in the data base but does include a brief summary of the types and numbers of analyses in the data base and a discussion of bias in the data base. The report also provides a list of published sources of data used to create the data base.

CONTENTS OF DATA BASE

The data base contains chemical analyses of samples that were collected as part of NIWQP investigations. The information used to construct the data base was derived primarily from the reports listed in table 1. Physiographic and cultural data that describe the study areas and individual data-collection sites and some water and biological data that were not collected as part of a NIWQP investigation also were included in the NIWQP data base. (An attribute in the data base indicates which samples were collected as part of NIWQP investigations.)

Some samples from NIWQP sampling sites have been collected and analyzed by the U.S. Geological Survey (USGS) as part of other programs. For sites used by NIWQP investigators, all water analyses made by the USGS during the period 1986 through 1993 were included in the data base regardless of whether they were collected as part of the NIWQP or for another program. These additional data were entered in the NIWQP data base exactly as retrieved from the National Water Information System (NWIS) data base.

The NIWQP data base contains more than 30 attributes for physiographic, geologic, hydrologic, climatological, agricultural, chemical, and cultural data (app. A) that collectively describe each of the 26 study areas. More than 440 attributes store values for concentrations of chemicals in water, bottom sediment, and biota. Samples for chemical analysis of water and (or) bottom sediment were collected at 1,264 data-collection sites in 14 Western States. Of these 1,264 sites, 705 were river, stream, canal, or surface-drain sites, 348 were ground-water sites, and 211 were lake or pond sites. Also, 130 of the 1,264 are reference sites, and the remainder are sites affected in some way by irrigation drainage.

The data base includes 6,903 chemical analyses of surface water; of these 6,903 analyses, 1,661 include all major constituents, and most of these 1,661 also include trace elements. Some specific contaminants are represented by thousands of analyses, for instance, the data base contains 2,507 analyses of dissolved selenium and 545 analyses of total selenium. Also included are more than 100 analyses of organochlorine pesticides such as dichloro-diphenyl-trichloroethane (DDT) in water and almost 200 analyses of herbicides such as 2,4 dichlorophenoxyacetic acid (240). Analyses of nutrients include 1,408 for nitrate and 562 for phosphate.

Inorganic constituents in bottom sediment are represented by 707 analyses of samples collected at 324 sites. Although for some study areas only one size fraction was analyzed, typically, both fine (less than 0.062 mm) and coarse (less than 2-millimeter) fractions were analyzed. The data base also includes 223 analyses for organochlorine pesticides such as DDT and 36 analyses for organophosphates such as parathion in bottom sediments.

Inorganic constituents in biota are represented by 8,217 analyses, including 2,410 from fish tissue, 751 from invertebrate tissue, and 1,086 from plant material. The data base contains 3,913 analyses of bird tissue, of which 1,235 are of bird livers and 2,051 are of bird eggs. Also included are a few analyses of periphyton and of tissues from reptiles, amphibians, and mammals.

Data-Base Bias

The NIWQP data base is biased in three ways that preclude its use for calculating baseline conditions in the Western United States:

1. Study areas were selected because of their potential to have irrigation-induced water-quality problems. Those study areas that were contaminated were further investigated. This approach results in a bias toward contaminated samples.
2. Within each study area, the sampling sites were not selected randomly. In some areas, many of the sampling sites were selected along main channels of large rivers because of the availability of historical data for these sites. This approach results in a bias toward uncontaminated samples in some areas because contaminants in main-channel sites tend to be more diluted. In other areas, many sites were selected for complete chemical analyses after field measurements indicated that they likely were contaminated. This approach results in a bias toward contaminated samples in other areas.
3. Within a study area, not all sites were sampled at the same frequency. During process-oriented investigations, typically the most contaminated sites were sampled more frequently than the least contaminated sites. This approach results in a bias toward contaminated samples.

STRUCTURE OF DATA BASE

Data Structure

The data base was designed so that relations among contaminant concentrations in water, bottom sediment, and biota can be explored. A diagram of the data structure of the NIWQP data base and the relations between the tables is shown in figure 2. Names of attributes and of tables shown in the diagram are explained in appendix A.

The AREA table within the data base contains information describing the 26 NIWQP study areas and associated subareas. For a given study area, the data in the table include amounts of evaporation and precipitation, general information about the geology and hydrology, the principal crop, and the amount of irrigated land.

The tables are linked by several key attributes (fig. 2). The AREA table is linked to the SITE table by the "area" and "sub_area" attributes, and in turn, the SITE table is linked to the other tables (in different matrix groups) by the "site_id" attribute. The SITE table contains all the primary site information, including the geographic location, the type of site, and whether the site is a reference site or is in or downstream from irrigated lands.

The tabulated chemical data are classified by type of sample matrix: water, bottom sediment, or biota. These matrix groups are cross-referenced by the linking attribute "site_id." Additionally, in the tables containing chemical data from water samples, splits of the same sample are linked through the "site_id," "samp_date," "samp_time," and "matrix" attributes.

The following tables (app. A) contain chemical data and related information from analyses of water samples:

- **FIELD** — Time-dependent data collected during the site visit (for example, pH and specific conductance) and corresponding laboratory values. Also contains metadata concerning the sampling and analysis and includes linking attributes that connect it to the SITE table ("site_id") and to other tables within the same matrix group ("matrix");
- **INORG** — Time-dependent data on inorganic chemicals and physical parameters measured in the laboratory (for example, major ions and filtered and total trace elements);
- **ISOTOPE** — Time-dependent data on stable and radioactive isotopes (for example, deuterium, tritium, and gross alpha and beta radioactivity);
- **NUTRIENT** — Time-dependent data on nutrients (for example, biochemical oxygen demand, nitrogen, and orthophosphate);
- **ORG** — Time-dependent data on organic chemicals (principally pesticides); and
- **SEDIMENT** — Time-dependent chemical data and physical characteristics of sediment (for example, suspended arsenic, suspended-sediment fall diameter, and suspended-sediment discharge).

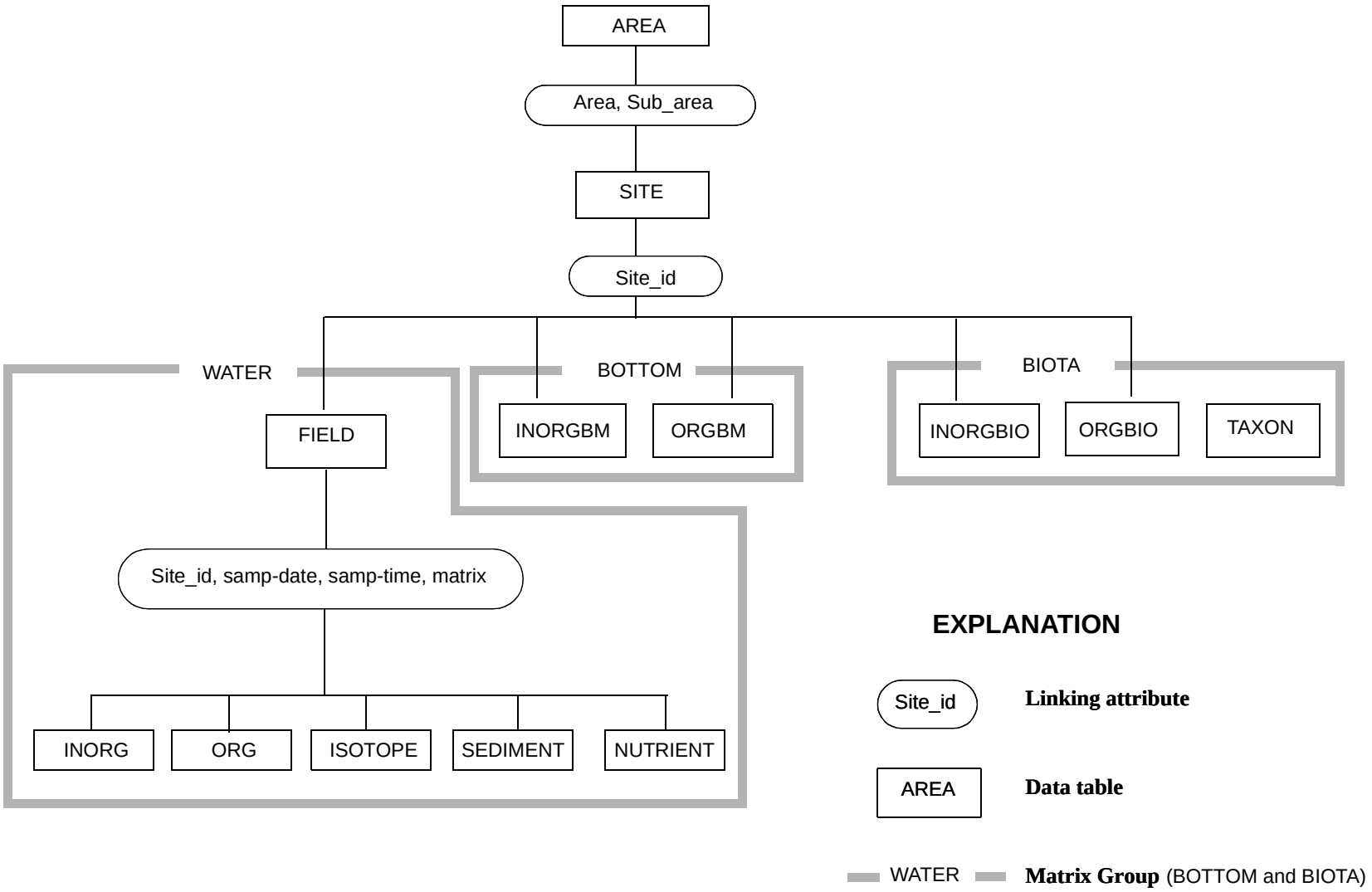


Figure 2. Structure and linking attributes of National Irrigation Water Quality Program data base.

The following tables (app. A) contain chemical data from analyses of bottom-sediment samples and related information:

- **INORGBM** — Time-dependent data on inorganic constituents in bottom sediment (for example, size fraction and concentrations of organic carbon and trace elements); and
- **ORGBM** — Time-dependent data on organic constituents in bottom sediment (principally pesticides, but also includes concentrations of organic carbon).

The INORGBM and ORGBM tables are not linked to other tables of chemical data because time of sample collection is not available for the INORGBM table and because the data-synthesis team was not exploring relations between concentrations of inorganic and organic constituents in samples of bottom sediment. It is likely, however, that bottom-sediment samples collected from the same location on the same date represent the same environmental matrix and could be joined using the "site_id" and "samp_date" attributes.

The following tables contain chemical data from analyses of biological samples and related information:

- **INORGBIO** — Time-dependent data on inorganic constituents in biological samples (for example, species, tissue, moisture content, and trace-element concentrations); and
- **ORGBIO** — Time-dependent data on organic constituents (principally pesticides) in biological samples (for example, species, tissue, moisture content, and DDT).

The INORGBIO and ORGBIO tables are not linked to each other because the analyses may not be of the same organism even if the species, tissues, dates, and locations of sample collection are the same.

The table **TAXON** provides information about the taxonomic classification of biological samples represented in the data base. In the INORGBIO and ORGBIO tables, biological samples are classified by the common name most frequently used in the NIWQP reports. The TAXON table is not linked to other tables and has only one attribute in common with the other tables. The attribute "niwqp_name" in the TAXON table relates scientific and common names to the common name "species" used in the INORGBIO and ORGBIO tables.

Data Dictionary and Discussion of Attributes

A data dictionary (apps. A and B) was created to describe the NIWQP data base. The dictionary provides a complete inventory of the data attributes and their characteristics and definitions. It also functions as a directory to show the location and format of the data—to help the user access the information in the data base.

To the extent possible, attributes were given descriptive names. However, in one of the programming languages used to create the data base, attribute names could not exceed 16 characters and this limitation carried over into the SQL data bases. This limitation resulted in cryptic names for some organic chemicals. Attribute names for inorganic constituents are based on their chemical symbols. Notable exceptions are some of the attributes involving arsenic and dissolved oxygen (for example, "ars" and "dox") because "AS" and "DO" are key words reserved by SQL.

For bottom-sediment and biotic samples, the attribute names end in "_bm" and "_bio," respectively, to indicate the matrix (for example, selenium in bottom sediment is "se_bm," and selenium in biological material, "se_bio"). Matrix for water samples is not indicated in the attribute names. (Total-selenium concentrations in water are "se_t"; filtered-selenium concentrations in water are simply "se.")

Although not listed in appendix A, a "remarks" attribute of character-type is associated with almost every listed attribute. This attribute of length one indicates if the value for the associated attribute is less than the method reporting limit by the code "<." The naming convention for such remarks attributes is to add the suffix "_r" to the name of the attribute with which it is associated.

DATA SOURCES AND RETRIEVAL

The NIWQP data base was created by gathering data from published reports (table 1), digital data bases, and analytical-laboratory data sheets for biological samples. After retrieval, the data were stored in P-STAT (P-Stat Inc., 1990) files on a Prime minicomputer at the USGS office in Carson City, Nev. P-STAT is an interactive computing system for files management, data modification, and statistical analysis. The data were manipulated and prepared using P-STAT before being imported into the Ingres data base on Data General workstations.

Area and Site Tables

Data describing the 26 study areas for the AREA table were obtained from published reports (table 1) or directly from knowledgeable study-team members who had investigated an area. Geology and free-water-surface evaporation-rates data were obtained by plotting the locations of the data-collection sites on appropriate thematic maps of the United States (King and Beikman, 1974; Farnsworth and others, 1982). Values for the derived attributes were determined from National, rather than local, maps to maintain consistency among the 26 study areas. An American Standard Code for Interface Exchange (ASCII) file containing the data was created by using a text editor and was imported into a P-STAT file on the USGS Prime computer.

Data describing the individual data-collection sites for the SITE table were obtained from published reports, from the USGS NWIS data-base site files, and directly from study-team members. Lists of unique site-identification numbers for the data-collection sites were obtained from the published reports or from the USGS team leader of each investigation. Site data, such as altitude, latitude, longitude, and site name, were retrieved from NWIS files, if available. For bottom-sediment sites without NWIS data, the site data were obtained from published reports.

Water and Bottom-Sediment Tables

Chemical data for water samples (FIELD, INORG, ISOTOPE, NUTRIENT, SEDIMENT, and ORG tables) and pesticide data for bottom-sediment samples (ORGBM table) were obtained from the NWIS data base. All chemical analyses made from 1986 to the date of the final retrieval were obtained from lists of unique site-identification numbers for the data-collection sites.

Inorganic-chemical data for bottom sediment (INORGBM) were obtained from Severson and others (1987), Harms and others (1990) and Stewart and others (1992). Although the data are stored in USGS data bases, it was impractical to transfer some of the data electronically. ASCII data files were created from tables in the two earlier reports by scanning the published data and applying optical-character-recognition software to the resulting files. Data from Stewart and others (1992) were uploaded directly from the floppy disk provided with the report. Some unpublished USGS data (R.C. Severson, U.S. Geological Survey, written commun., 1994) provided directly to the authors as ASCII files on floppy disk were imported into P-STAT files.

Biological Tables

Chemical data for biological samples (INORGBIO and ORGBIO tables) were obtained directly from the analytical-laboratory data sheets and entered into a spreadsheet on a PC. Although much of the data were available in PC-based spreadsheets and data bases at individual U.S. Fish and Wildlife Service (USFWS) field offices, obtaining the data from analytical-laboratory data sheets expedited importing the data into the Ingres data base and subsequent quality assurance of the data. Because the order of analyses and variables in data from the USFWS field offices did not match the order on the laboratory data sheets, data transfer and quality assurance were slow. Converting the field spreadsheets and data bases to a consistent format for input into the NIWQP data base was particularly labor intensive.

MANIPULATION OF DATA

After chemical data for water, bottom sediment, and biota were gathered from the various sources, they were manipulated on the USGS Prime minicomputer using P-STAT software. Data manipulation involved organizing the attributes, correcting errors in the NIWQP data, and preparing the data for creation of the Ingres data base. Duplicate analyses or empty records retrieved from the NWIS data base were deleted from the NIWQP data base.

Attributes were added to the data base, given descriptive names, and ordered. Variables added to the data base included those describing the data-collection sites (attributes “area,” “sub_area,” “source,” “background”) and those describing individual analyses (“doi,” “qaqc”). Chemical attributes in the NWIS data base are identified only by nondescriptive numbers called parameter codes; in the NIWQP data base, all attributes are identified by descriptive names and are ordered by name and grouped by type (trace elements, isotopes, pesticides, etc.).

In the NWIS data base, analytes from different matrices can be combined under one analysis. For example, pesticides in bottom sediment can be in the same analysis as trace elements in water. For the NIWQP data base, analyses that combined analytes from different matrices were manipulated so that each record represents only one matrix.

In the NWIS data base, some replicate analyses are not identified as being quality-assurance samples. Instead, sample times were used to differentiate replicate quality-assurance samples. Some analyses in the NWIS data base contain some values that represent duplicates and some that do not. For the NIWQP data base, when duplicate or triplicate sets of analyses were identified, the first analysis in time was classified as the environmental sample and the others as quality-assurance samples. Analytes that were not replicated in both samples were moved from the quality-assurance sample to the environmental sample in the NIWQP data base.

SQL command files were written to create Ingres tables and read ASCII data files to populate them.

DATA-BASE QUALITY-ASSURANCE PROCEDURES

The NIWQP data base was checked carefully to assure that all analyses in the published reports (table 1) were included in the data base. Data also were checked to ensure that retrieval and manipulation of the data had not introduced errors, especially systematic errors. In one case, for example, data manipulation had resulted in the loss of "<" symbols. Errors discovered during quality assurance were investigated and corrected. The causes of systematic errors were identified and eliminated, and all affected analyses rechecked and corrected if needed.

As part of the quality-assurance procedures, NIWQP data values also were checked to ensure that they matched published values. If errors so identified were small and within a few percent of each other, the values in the NIWQP data base were corrected to match the values in the NWIS data base, the USGS data reports, and the USFWS analytical-laboratory data sheets. For larger differences, the senior author of the published data report (table 1) was contacted and the reasons for the discrepancy were investigated. For the NIWQP data base, all differences between published data reports and the source data bases were considered to be the result of transcription error or typographic errors introduced during subsequent word processing. In cases where the NWIS data base was in error, the value in the NWIS data base was corrected. It was the responsibility of the authors of the individual study-area reports and the analytical laboratories to update the NWIS data base as well as the data reports if errors were found.

Water Data

For each NIWQP study area, 20 percent of the water-quality analyses were verified completely against the published data reports. For a given area, every fifth analysis was selected systematically for verification. All data in the NIWQP data base for the selected analyses were compared with the corresponding published values.

Not all data collected during the NIWQP investigations were published, and therefore some of the data in the NIWQP data base could not be checked against published reports. Examples of unpublished data include some analytical results in which all the values were less than the analytical reporting limit. Additionally, some field values for water samples were not published if the principal reason for the site visit was collection of bottom sediment.

Agreement between data in the NWIS and NIWQP data bases and the published reports is very good. For example, when more than 2,000 individual data values from analyses of 93 samples from the Stillwater Wildlife Management Area (Nevada) were checked, only 5 discrepancies were found. In the San Juan River area (New Mexico), only 1 discrepancy was found in more than 400 individual values for 11 samples. The reason for the good match is probably that, for most of the published data reports, the water-quality tables were essentially data dumps from NWIS that received only minimal word processing. Many of the discrepancies were related to word-processing errors and insufficient verification. For example, the negative sign in δD and $\delta^{18}O$ values had been converted to "<" symbols in one of the data reports on the Kendrick Reclamation Project (Wyoming).

Bottom-Sediment Data

Because relatively few analyses of bottom sediment were done, all values for selenium, arsenic, and molybdenum in the <0.062 fraction were checked against published values. In addition, all constituents were checked in two randomly chosen analyses from each study area. If these checks revealed a disproportionately high number of errors in a study area then all values for all analyses from that study area were checked.

In a small number of cases, values in the NIWQP data base and reports from the analytical laboratory did not match values in the later published NIWQP reports. In these cases, values from the reports from the analytical laboratory were used. Tables in those reports were considered more reliable than those in the NIWQP reports because they are essentially data dumps from the USGS analytical-laboratory data base. Usually the errors were minor and involved differences in rounding or missing "<" symbols. In one case, however, significant errors were found in a published source: The values for several elements were scrambled during word processing of the San Juan River area (New Mexico) report (Blanchard and others, 1993).

Biological Data

As discussed in the section "Biological Tables," the biological data in the NIWQP data base were retrieved from the original laboratory reports. Those reports were checked for agreement with published data reports (table 1), for accuracy of wet-weight to dry-weight conversions, for sampling dates (if not reported in published reports), and, in some cases, to verify the taxonomic identification of individual samples. After data from each original laboratory report were entered into the master spreadsheet and made to conform to uniform conventions for data rounding and the reporting of values below detection limits, each analytical value was verified individually for keypad-entry errors by other members of the data-entry team. Thus, each datum entry ultimately was reviewed for accuracy by no fewer than three people.

DISSEMINATION

The NIWQP data base is static and is not being updated as new results from ongoing NIWQP investigations become available. The data base is available as a set of Microsoft Access files and as a set of SQL commands and associated ASCII data files from the NIWQP home-page on the World Wide Web <http://www.usbr.gov/niwqp>.

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APPENDICES

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*

[Acceptable codes for fixed-value attributes are explained in appendix B. Char, fixed-length character string of 1 to 2,000 characters; date, formatted-date data type; *ddd–mm–ss*, degrees–minutes–seconds longitude format; *dd–mm–ss*, degrees–minutes–seconds latitude format; *dd–mmm–yy*, day–month–year date format; float, floating-point data type; *hhmm*, hour–minute time-of-day (24-hour clock) format; integer, 4-byte integer data type; *mmdd*, month–day date format; *mm/dd/yy*, month/day/year date format; NIWQP, National Irrigation Water Quality Program; NWIS, National Water Information System; smallint, 2-byte integer data type; varchar, varying-length character string of 1 to 2,000 characters. —, not applicable]

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
AREA table (stores data on regional study areas)						
area	•	•	Varchar	10	—	Abbreviated name identifying NIWQP study area
sub_area	•	•	Varchar	10	—	Abbreviated name identifying subarea within NIWQP study area
basin_size			Float	4	—	Size of contributing drainage basin, in square miles
fwse			Float	4	—	Range of free-water-surface evaporation, in inches (Farnsworth and others, 1982)
avgfwse			Float	4	—	Average free-water-surface evaporation, in inches (Farnsworth and others, 1982)
avgprecip			Float	4	—	Average annual precipitation (middle of precip attribute), in inches
precip			Varchar	10	—	Range of precipitation given in NIQWP report (table 1), in inches
yrprecip			Float	4	—	Precipitation during year of data collection, in inches
geology		•	Char	25	—	Geologic units in study area (King and Beikman, 1974)
mining		•	Char	1	—	Whether mining occurs in study area
se_source			Char	40	—	Specific geologic information given in NIWQP reports (table 1) about selenium source materials
basin		•	Char	1	—	Whether lakes in basin are terminal or flowthrough
drains			Char	1	—	Whether drains are buried or open
crop			Varchar	11	—	Principal irrigated crop in study area
irr_acres			Float	4	—	Amount of irrigated land within area or subarea, in acres
irr_end			Char	4	—	Typical month and day irrigation ends, in *mmdd* format
irr_start			Char	4	—	Typical month and day irrigation begins, in *mmdd* format
pesticides		•	Char	1	—	Whether pesticides are in heavy use in area
remarks			Varchar	36	—	Comments about study area
SITE table (stores data on sample-collection sites)						
site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
area	•	•	Varchar	10	—	Abbreviated name identifying NIWQP study area
sub_area	•	•	Varchar	10	—	Abbreviated name identifying subarea within NIWQP study area
site_name			Varchar	51	—	Descriptive name of data-collection site
site			Varchar	9	—	Identifying name or number used in published report (table 1) and unique within study area covered by that report. If different names for same site were used in reconnaissance- and detailed-investigation reports, both names are used and identifier from reconnaissance report is enclosed in parentheses.
site_type		•	Varchar	2	—	Whether site is surface-water, ground-water, or other type of site
background		•	Char	1	—	Whether site is upgradient or downgradient from effects of irrigation in study area
source		•	Char	1	—	Whether site represents source water for irrigation in study area
latitude			Char	6	—	Latitude of data-collection site, in degrees, minutes, and seconds (*ddmmss* format)
longitude			Char	7	—	Longitude of data-collection site, in degrees, minutes, and seconds (*dddmmss* format)
altitude			Float	4	—	Altitude of data-collection site, in feet
drain_area			Float	4	—	Drainage area of surface-water data-collection site, in square miles
well_depth			Float	4	—	Well depth of ground-water data-collection site, in feet below land surface
sitegeology		•	Char	5	—	Generalized geology at sampling site
sitefwse			Float	4	—	Free-water-surface evaporation rate at site, in inches
distance			Float	4	—	Distance of sample collection in stream cross section from left bank, in feet

FIELD table (stores data on field conditions at sample-collection sites during field visits)						
site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
samp_time	•		Integer	2	—	Time of sample collection (*hhmm* format)
matrix	•	•	Char	2	—	Sample matrix
qaqc		•	Char	1	—	Whether purpose of sample collection was quality assurance
doi		•	Char	1	—	Whether analysis was made as part of NIWQP investigation
recno			Varchar	8	—	U.S. Geological Survey identifer used for sample in NWIS data base
samp_meth		•	Integer	2	—	Sample-collection method
agyanal		•	Integer	4	—	Analyzing agency
agycol		•	Integer	4	—	Collecting agency
depth_samp			Float	4	—	Depth of sample collection below water surface, in feet
distance			Float	4	—	Distance of sample collection in stream cross section from left bank, in feet
wtr_level			Float	4	—	Ground-water level below water surface, in feet
q			Float	4	00061	Discharge, instantaneous, stream, in cubic feet per second
ntu			Float	4	00076	Turbidity, in nephelometer turbidity units
airt			Float	4	00020	Temperature, air, in degrees Celsius
temp			Float	4	00010	Temperature, water, in degrees Celsius
dox			Float	4	00300	Oxygen, dissolved, in milligrams per liter
doxpct			Integer	2	00301	Oxygen, dissolved, in percent saturation
baro_p			Integer	2	00025	Barometric pressure, in millimeters of mercury
cond			Integer	4	00094	Specific conductance, field, in microsiemens per centimeter at 25 degrees Celsius
cond_lab			Integer	4	90095	Specific conductance, laboratory, in microsiemens per centimeter at 25 degrees Celsius
ph			Float	4	00400	pH, whole water, field, in standard units
ph_lab			Float	4	00403	pH, whole water, laboratory, in standard units
redox			Float	4	00090	Oxidation–reduction potential, in millivolts
sulfide			Float	4	00745	Sulfide, total, as S, in milligrams per liter
INORG table (stores data on inorganic constituents in water samples)						
site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
samp_time	•		Integer	2	—	Time of sample collection (*hhmm* format)
matrix	•	•	Char	2	—	Sample matrix
hardness			Float	4	00900	Hardness, as $CaCO_3$, total, in milligrams per liter
ca			Float	4	00915	Calcium, dissolved, as Ca, in milligrams per liter
ca_t			Float	4	00916	Calcium, total, recoverable, as Ca, in milligrams per liter
mg			Float	4	00925	Magnesium, dissolved, as Mg, in milligrams per liter
mg_t			Float	4	00927	Magnesium, total, as Mg, in milligrams per liter
na			Float	4	00930	Sodium, dissolved, as Na, in milligrams per liter
na_t			Float	4	00929	Sodium, total, recoverable, as Na, in milligrams per liter
sar			Float	4	00931	Sodium adsorption ratio
k			Float	4	00935	Potassium, dissolved, as K, in milligrams per liter
k_t			Float	4	00937	Potassium, total, as K, in milligrams per liter

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
INORG table (stores data on inorganic constituents in water samples)—*Continued*						
alk			Float	4	00410	Alkalinity, titration to pH 4.5, field, as $CaCO_3$, in milligrams per liter
alk_co3_it			Float	4	99430	Alkalinity, carbonate, incremental titration, field, as $CaCO_3$, in milligrams per liter
alk_dis_it			Float	4	39086	Alkalinity, total, dissolved, incremental titration, field, as $CaCO_3$, in milligrams per liter
alk_it			Float	4	00419	Alkalinity, incremental titration, field, as $CaCO_3$, in milligrams per liter
alk_lab			Float	4	90410	Alkalinity, titration to pH 4.5, laboratory, as $CaCO_3$, in milligrams per liter
alk_ww_fe			Float	4	00417	Alkalinity, water, whole, total, fixed-endpoint titration, laboratory, as $CaCO_3$, in milligrams per liter
alk_ww_gt			Float	4	29813	Alkalinity, water, whole, gran titration, field, as $CaCO_3$, in milligrams per liter
co3			Float	4	00445	Carbonate, total, fixed-endpoint titration, field, as CO_3, in milligrams per liter
co3_ft			Float	4	00452	Carbonate, dissolved, incremental titration, field, as CO_3, in milligrams per liter
co3_it			Float	4	00447	Carbonate, total, incremental titration, field, as CO_3, in milligrams per liter
co3_it_2			Float	4	99445	Carbonate, incremental titration, field, as CO_3, in milligrams per liter
hco3			Float	4	00440	Bicarbonate, total, fixed-endpoint titration, field, as HCO_3, in milligrams per liter
hco3_ft			Float	4	00453	Bicarbonate, dissolved, incremental titration, field, as HCO_3, in milligrams per liter
hco3_it			Float	4	00450	Bicarbonate, total, incremental titration, field, as HCO_3, in milligrams per liter
hco3_it_2			Float	4	99440	Bicarbonate, incremental titration, field, as HCO_3, in milligrams per liter
so4			Float	4	00945	Sulfate, dissolved, as SO_4, in milligrams per liter
so4_unc			Float	4	99890	Sulfate, water, dissolved, uncorrected, as SO_4, in milligrams per liter
cl			Float	4	00940	Chloride, dissolved, as Cl, in milligrams per liter
f			Float	4	00950	Fluoride, dissolved, as F, in milligrams per liter
si			Float	4	00955	Silica, dissolved, as SiO_2, in milligrams per liter
ds_sum			Float	4	70301	Solids, sum of constituents, dissolved, in milligrams per liter
res105_t			Float	4	00500	Solids, residue on evaporation at 105 degrees Celsius, total, in milligrams per liter
res180			Float	4	70300	Solids, residue on evaporation at 180 degrees Celsius, dissolved, in milligrams per liter
ag			Float	4	01075	Silver, dissolved, as Ag, in micrograms per liter
ag_t			Float	4	01077	Silver, total, as Ag, in micrograms per liter
al			Float	4	01106	Aluminum, dissolved, as Al, in micrograms per liter
al_t			Float	4	01105	Aluminum, total, as Al, in micrograms per liter
ars			Float	4	01000	Arsenic, dissolved, as As, in micrograms per liter
ars_t			Float	4	01002	Arsenic, total, as As, in micrograms per liter
b			Float	4	01020	Boron, dissolved, as B, in micrograms per liter
b_t			Float	4	01022	Boron, total, as B, in micrograms per liter
ba			Float	4	01005	Barium, dissolved, as Ba, in micrograms per liter
ba_t			Float	4	01007	Barium, total, as Ba, in micrograms per liter
be			Float	4	01010	Beryllium, dissolved, as Be, in micrograms per liter
be_t			Float	4	01012	Beryllium, total, as Be, in micrograms per liter
br			Float	4	71870	Bromide, dissolved, as Br, in milligrams per liter

cd	Float	4	01025	Cadmium, dissolved, as Cd, in micrograms per liter
cd_t	Float	4	01027	Cadmium, total, as Cd, in micrograms per liter
co	Float	4	01035	Cobalt, dissolved, as Co, in micrograms per liter
co_t	Float	4	01037	Cobalt, total, as Co, in micrograms per liter
cr	Float	4	01030	Chromium, dissolved, as Cr, in micrograms per liter
cr_t	Float	4	01034	Chromium, total, as Cr, in micrograms per liter
cr_hex	Float	4	01032	Chromium, hexavalent, as Cr, in micrograms per liter
cu	Float	4	01040	Copper, dissolved, as Cu, in micrograms per liter
cu_t	Float	4	01042	Copper, total, as Cu, in micrograms per liter
fe	Float	4	01046	Iron, dissolved, as Fe, in micrograms per liter
fe_t	Float	4	01045	Iron, total, as Fe, in micrograms per liter
hg	Float	4	71890	Mercury, dissolved, as Hg, in micrograms per liter
hg_t	Float	4	71900	Mercury, total recoverable, as Hg, in micrograms per liter
i	Float	4	71865	Iodide, dissolved, as I, in milligrams per liter
li	Float	4	01130	Lithium, dissolved, as Li, in micrograms per liter
li_t	Float	4	01132	Lithium, total, as Li, in micrograms per liter
mn	Float	4	01056	Manganese, dissolved, as Mn, in micrograms per liter
mn_t	Float	4	01055	Manganese, total, as Mn, in micrograms per liter
mo	Float	4	01060	Molybdenum, dissolved, as Mo, in micrograms per liter
mo_t	Float	4	01062	Molybdenum, total, as Mo, in micrograms per liter
ni	Float	4	01065	Nickel, dissolved, as Ni, in micrograms per liter
ni_t	Float	4	01067	Nickel, total, as Ni, in micrograms per liter
pb	Float	4	01049	Lead, dissolved, as Pb, in micrograms per liter
pb_t	Float	4	01051	Lead, total, as Pb, in micrograms per liter
sb	Float	4	01095	Antimony, dissolved, as Sb, in micrograms per liter
sb_t	Float	4	01097	Antimony, total, as Sb, in micrograms per liter
se	Float	4	01145	Selenium, dissolved, as Se, in micrograms per liter
se_t	Float	4	01147	Selenium, total, as Se, in micrograms per liter
sr	Float	4	01080	Strontium, dissolved, as Sr, in micrograms per liter
sr_t	Float	4	01082	Strontium, total, as Sr, in micrograms per liter
tl	Float	4	01057	Thallium, dissolved, as Tl, in micrograms per liter
tl_t	Float	4	01059	Thallium, total, as Tl, in micrograms per liter
v	Float	4	01085	Vanadium, dissolved, as V, in micrograms per liter
zn	Float	4	01090	Zinc, dissolved, as Zn, in micrograms per liter
zn_t	Float	4	01092	Zinc, total, as Zn, in micrograms per liter

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
ISOTOPE table (stores data on inorganic isotopes in water samples)						
site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
samp_time	•		Integer	2	—	Time of sample collection (*hhmm* format)
matrix	•	•	Char	2	—	Sample matrix
alpha_ugl			Float	4	80030	Gross alpha radioactivity, dissolved, as natural U, in micrograms per liter
alpha_ugl_t			Float	4	80040	Gross alpha radioactivity, total, suspended, as natural U, in micrograms per liter
beta_cs			Float	4	03516	Gross beta radioactivity, suspended, as Cs-137, in picocuries per liter
beta_sr			Float	4	80050	Gross beta radioactivity, dissolved, as Sr/Y-90, in picocuries per liter
c13			Float	4	82081	Carbon-13/12 ratio, in permil
deut			Float	4	82082	Hydrogen-2/1 ratio, in permil
k40			Float	4	82068	Potassium-40, dissolved, as K-40, in picocuries per liter
o18			Float	4	82085	Oxygen-18/16 ratio, in permil
ra_226_pcl			Float	4	09511	Radium-226, dissolved, radon method, in picocuries per liter
ra_226_plcht			Float	4	09510	Radium-226, dissolved, planchet count, in picocuries per liter
radon_t			Float	4	82303	Radon-222, total, in picocuries per liter
radon_t_2sig			Float	4	76002	Radon-222, 2-sigma-precision estimate, water, whole, total, in picocuries per liter
s34			Float	4	82086	Sulfur-34/32 ratio, in permil
trit			Integer	2	07000	Tritium, total, in picocuries per liter
trit_2sig			Float	4	75985	Tritium, 2-sigma-precision estimate, water, whole, total, in picocuries per liter
u			Float	4	22703	Uranium, natural, dissolved, as U, in micrograms per liter
u_2sig			Float	4	75990	Uranium, natural, 2-sigma-precision estimate, water, dissolved, as U, in micrograms per liter
u_ext_ugl			Float	4	80020	Uranium, dissolved, as U, extraction fluorometric, in micrograms per liter
u_t			Float	4	28011	Uranium, natural, total, as U, in micrograms per liter
u_t_2sig			Float	4	75993	Uranium, natural, 2-sigma-precision estimate, water, whole, total, as U, in micrograms per liter
NUTRIENT table (stores data on nutrients in water samples)						
site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
samp_time	•		Integer	2	—	Time of sample collection (*hhmm* format)
matrix	•	•	Char	2	—	Sample matrix
bod			Float	4	00310	Oxygen demand, biochemical, 5-day, at 20 degrees Celsius, in milligrams per liter
cod			Float	4	00340	Oxygen demand, chemical, 0.25 N potassium dichromate, in milligrams per liter
doc			Float	4	00681	Carbon, organic, dissolved, as C, in milligrams per liter
toc			Float	4	00680	Carbon, organic, total, as C, in milligrams per liter
cn_d			Float	4	00723	Cyanide, dissolved, as CN, in milligrams per liter
cn_t			Float	4	00720	Cyanide, total, as CN, in milligrams per liter

n			Float	4	00602	Nitrogen, dissolved, as N, in milligrams per liter
n_tot			Float	4	00600	Nitrogen, total, as N, in milligrams per liter
nitr_t			Float	4	71887	Nitrogen, total, as NO_3, in milligrams per liter
no2			Float	4	00613	Nitrogen, nitrite, dissolved, as N, in milligrams per liter
no2_t			Float	4	00615	Nitrogen, nitrite, total, as N, in milligrams per liter
no2_no3			Float	4	00631	Nitrogen, nitrite plus nitrate, dissolved, as N, in milligrams per liter
no2_no3_t			Float	4	00630	Nitrogen, nitrite plus nitrate, total, as N, in milligrams per liter
n_kjel			Float	4	00625	Nitrogen, Kjeldahl (ammonia plus organic), total, as N, in milligrams per liter
n_org_t			Float	4	00605	Nitrogen, organic, total, as N, in milligrams per liter
nh3			Float	4	00608	Nitrogen, ammonia, dissolved, as N, in miiligrams per liter
nh3_org			Float	4	00623	Nitrogen, ammonia plus organic, dissolved, as N, in milligrams per liter
nh3_union			Smallint	2	00619	Nitrogen, ammonia, un-ionized, as N, in milligrams per liter
nh3_nh4			Float	4	00610	Nitrogen, ammonia, and ammonium, total, as N, in milligrams per liter
nh4_nh4			Float	4	71846	Nitrogen, ammonia, dissolved, as NH_4, in milligrams per liter
p			Float	4	00666	Phosphorus, dissolved, as P, in milligrams per liter
p_t			Float	4	00665	Phosphorus, total, as P, in milligrams per liter
phos_t			Float	4	71886	Phosphorus, total, as PO_4, in milligrams per liter
po4			Float	4	00671	Phosphorus, orthophosphate, dissolved, as P, in milligrams per liter
p_hyd			Float	4	00677	Phosphorus, hydrolyzable plus orthophosphate, dissolved, as P, in milligrams per liter
p_ortho			Float	4	70507	Phosphorus, orthophosphate, total, as P, in milligrams per liter

ORG table (stores data on organic chemicals in water samples)

site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
samp_time	•		Integer	2	—	Time of sample collection (*hhmm* format)
matrix	•	•	Char	2	—	Sample matrix
acenaphthene			Float	4	34205	Acenaphthene, total, in micrograms per liter
acenaphthylene			Float	4	34200	Acenaphthylene, total, in micrograms per liter
alachlor			Float	4	77825	Alachlor, total recoverable, in micrograms per liter
aldrin			Float	4	39330	Aldrin, total, in micrograms per liter
ametryne			Float	4	82184	Ametryne, total, in micrograms per liter
anthracene			Float	4	34220	Anthracene, total, in micrograms per liter
atrazine			Float	4	39630	Atrazine, total, in micrograms per liter
b2ethxphth			Float	4	39100	Bis(2-ethylhexyl) phthalate, total, in micrograms per liter
benzanthra			Float	4	34526	Benzo(a)anthracene, total, in micrograms per liter
benzapyrene			Float	4	34247	Benzo(a)pyrene, total, in micrograms per liter
benzbfluorant			Float	4	34230	Benzo(b)fluoranthene, total, in micrograms per liter
benzkfluorant			Float	4	34242	Benzo(k)fluoranthene, total, in micrograms per liter
benzperyln			Float	4	34521	Benzo(g,h,i)perylene, total, in micrograms per liter
bis2chlorethox			Float	4	34278	Bis(2-chloroethoxy) methane, total, in micrograms per liter
bis2chlorisopr			Float	4	34283	Bis(2-chloroisopropyl) ether, total, in micrograms per liter
bis2chloroethy			Float	4	34273	Bis(2-chloroethyl) ether, total, in micrograms per liter
brphphethr			Float	4	34636	4-Bromophenyl phenyl ether, total, in micrograms per liter
chlordane			Float	4	39350	Chlordane, technical and met, total, in micrograms per liter
chrysene			Float	4	34320	Chrysene, total, in micrograms per liter
clnaphthal			Float	4	34581	2-Chloronaphthalene, total, in micrograms per liter
clphenol			Float	4	34586	2-Chlorophenol, total, in micrograms per liter
clphnlphenethr			Float	4	34641	4-Chlorophenyl phenyl ether, total, in micrograms per liter
clpyrifos_t			Float	4	38932	Chlorpyrifos, total, recoverable, in micrograms per liter
cyanazine			Float	4	81757	Cyanazine, total, in micrograms per liter
cyprazine_t			Float	4	82187	Cyprazine total, in micrograms per liter

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
ORG table (stores data on organic chemicals in water samples)—*Continued*						
d24			Float	4	39730	2,4-Dichlorophenoxyacetic acid, total, in micrograms per liter
ddd			Float	4	39360	Dichloro-diphenyl-dichloroethane (DDD), total, in micrograms per liter
dde			Float	4	39365	Dichloro-diphenyl-dichloroethylene (DDE), total, in micrograms per liter
ddt			Float	4	39370	Dichloro-diphenyl-trichloroethane (DDT), total, in micrograms per liter
def_t			Float	4	39040	DEF (tributyl phosphorotrithioate), in micrograms per liter
diazinon			Float	4	39570	Diazinon, total, in micrograms per liter
dibenzanthr			Float	4	34556	1,2,5,6-Dibenzanthracene, total, in micrograms per liter
dicamba_t			Float	4	82052	Dicamba (Mediben, Banvel D), total, in micrograms per liter
diclbenz12			Float	4	34536	1,2-Dichlorobenzene, total, in micrograms per liter
diclbenz13			Float	4	34566	1,3-Dichlorobenzene, total, in micrograms per liter
diclbenz14			Float	4	34571	1,4-Dichlorobenzene, total, in micrograms per liter
diclphenol			Float	4	34601	2,4-Dichlorophenol, total, in micrograms per liter
dieldrin			Float	4	39380	Dieldrin, total, in micrograms per liter
dietpthlate			Float	4	34336	Diethylphthalate, total, in micrograms per liter
dimephtlate			Float	4	34341	Dimethylphthalate, total, in micrograms per liter
dimthphenl			Float	4	34606	2,4-Dimethylphenol, total, in micrograms per liter
dinocresol			Float	4	34657	4,6-Dinitro-orthocresol, total, in micrograms per liter
dinphenol			Float	4	34616	2,4-Dinitrophenol, total, in micrograms per liter
dintolu24			Float	4	34611	2,4-Dinitrotoluene, total, in micrograms per liter
dintolu26			Float	4	34626	2,6-Dinitrotoluene, total, in micrograms per liter
dioctphthl			Float	4	34596	Di-n-octyl phthalate, total, in micrograms per liter
disyston_t			Float	4	39011	Disyston (Disulfoton), total, in micrograms per liter
dnb_phtha			Float	4	39110	Di-n-butyl phthalate, total, in micrograms per liter
dp_2_4			Float	4	82183	2,4-Dichlorprop, total, in micrograms per liter
endosulf			Float	4	39388	Endosulfan, total, in micrograms per liter
endrin			Float	4	39390	Endrin, total, in micrograms per liter
ethion			Float	4	39398	Ethion, total, in micrograms per liter
flranthene			Float	4	34376	Fluoranthene, total, in micrograms per liter
fluorene			Float	4	34381	Fluorene, total, in micrograms per liter
fonofos			Float	4	82614	Fonofos (Dyfonate), water, whole, total recoverable, in micrograms per liter
guthion			Float	4	39580	Guthion, total, in micrograms per liter
hcb			Float	4	39700	Hexachlorobenzene, total, in micrograms per liter
heptchlr			Float	4	39410	Heptachlor, total, in micrograms per liter
heptepox			Float	4	39420	Heptachlor epoxide, total, in micrograms per liter
hexclbutdie			Float	4	39702	Hexachlorobutadiene, total, in micrograms per liter
hexclcyclpd			Float	4	34386	Hexachlorocyclopentadiene, total, in micrograms per liter
hexclethan			Float	4	34396	Hexachloroethane, total, in micrograms per liter
ind_pyr			Float	4	34403	Indeno(1,2,3-cd)pyrene, total, in micrograms per liter
isphrone			Float	4	34408	Isophorone, total, in micrograms per liter
lindane			Float	4	39340	Gamma-benzene hexachloride (lindane), total, in micrograms per liter

malathion	Float	4	39530	Malathion, total, in micrograms per liter
mbas	Float	4	38260	Methylene blue active substances, in milligrams per liter
methomyl	Float	4	39051	Methomyl, total, in micrograms per liter
methoxchlr	Float	4	39480	Methoxychlor, total, in micrograms per liter
metolachlor	Float	4	82612	Metolachlor, total recoverable, in micrograms per liter
metribuzin	Float	4	82611	Metribuzin, total recoverable, in micrograms per liter
mirex	Float	4	39755	Mirex, total, in micrograms per liter
mparathion	Float	4	39600	Methyl parathion, total, in micrograms per liter
mtrithion	Float	4	39790	Methyl trithion, total, in micrograms per liter
naphthalene	Float	4	34696	Naphthalene, total, in micrograms per liter
nbb_phth	Float	4	34292	N-Butylbenzyl phthlate, total, in micrograms per liter
nitrphenol4	Float	4	34646	4-Nitrophenol, total, in micrograms per liter
nsodimeth.t	Float	4	34438	N-nitrosodimethylamine, total, in micrograms per liter
nsodiphenyl.t	Float	4	34433	N-nitrosodiphenylamine, total, in micrograms per liter
ntrobenzen	Float	4	34447	Nitrobenzene, total, in micrograms per liter
ntrphenol2	Float	4	34591	2-Nitrophenol, total, in micrograms per liter
parathion	Float	4	39540	Parathion, total, in micrograms per liter
pcb	Float	4	39516	Polychlorinated biphyenyls, total, in micrograms per liter
pclmcresol	Float	4	34452	Parachlorometacresol, total, in micrograms per liter
pcn	Float	4	39250	Naphthalenes, polychlorinated, total, in micrograms per liter
pcn_d	Float	4	82360	Naphthalenes, polychlorinated, dissolved, in micrograms per liter
pcp	Float	4	39032	Pentachlorophenol, total, in micrograms per liter
perthane	Float	4	39034	Perthane, total, in micrograms per liter
phenol	Float	4	34694	Phenol (C_6H_5OH), total, in micrograms per liter
phnanthren	Float	4	34461	Phenanthrene, total, in micrograms per liter
phorate_t	Float	4	39023	Phorate, total, in micrograms per liter
picloram	Float	4	39720	Picloram (Tordon, Amdon), total, in micrograms per liter
prometone	Float	4	39056	Prometone, total, in micrograms per liter
prometryne	Float	4	39057	Prometryne, total, in micrograms per liter
propazine	Float	4	39024	Propazine, total, in micrograms per liter
propham	Float	4	39052	Propham, total, in micrograms per liter
pyrene	Float	4	34469	Pyrene, total, in micrograms per liter
sevin	Float	4	39750	Sevin (Carbaryl), total, in micrograms per liter
silvex	Float	4	39760	Silvex, total, in micrograms per liter
simazine	Float	4	39055	Simazine, total, in micrograms per liter
simetone_t	Float	4	82188	Simetone, total, in micrograms per liter
simetryne	Float	4	39054	Simetryne, total, in micrograms per liter
t245	Float	4	39740	2,4,5-Trichlorophenoxyacetic acid, total, in micrograms per liter
toxaphene	Float	4	39400	Toxaphene, total, in micrograms per liter
triclbenze	Float	4	34551	1,2,4-Trichlorobenzene, total, in micrograms per liter
triclphenl	Float	4	34621	2,4,6-Trichlorophenol, total, in micrograms per liter
trifluralin	Float	4	39030	Trifluralin, total recoverable, in micrograms per liter
trithion	Float	4	39786	Trithion, total, in micrograms per liter

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
SEDIMENT table (stores data on suspended sediment and bed material)						
site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
samp_time	•		Integer	2	—	Time of sample collection (*hhmm* format)
matrix	•	•	Char	2	—	Sample matrix (water, bottom sediment, or biota)
res105_sus			Float	4	00530	Solids, residue at 105 degrees Celsius, suspended, in milligrams per liter
beta_cs_sus			Float	4	03516	Gross beta radioactivity, suspended, as Cs-137, in picocuries per liter
beta_r_sus			Float	4	80060	Gross beta radioactivity, suspended, total, as Sr/Y-90, in picocuries per liter
ag_sus			Float	4	01076	Silver, suspended, as Ag, in micrograms per liter
as_t_sus			Float	4	01001	Arsenic, suspended, total, as As, in micrograms per liter
ba_rec_sus			Float	4	01006	Barium, suspended, recoverable, as Ba, in micrograms per liter
cd_sus			Float	4	01026	Cadmium, suspended, as Cd, in micrograms per liter
cr_sus			Float	4	01031	Chromium, suspended, as Cr, in micrograms per liter
co_sus			Float	4	01036	Cobalt, suspended, as Co, in micrograms per liter
cu_rec_sus			Float	4	01041	Copper, suspended, recoverable, as Cu, in micrograms per liter
fe_rec_sus			Float	4	01044	Iron, suspended, recoverable, as Fe, in micrograms per liter
hg_rec_sus			Float	4	71895	Mercury, suspended, recoverable, as Hg , in micrograms per liter
mn_rec_sus			Float	4	01054	Manganese, suspended, recoverable, as Mn, in micrograms per liter
nh3_org_sus			Float	4	00624	Nitrogen, ammonia plus organic, suspended, total, as N, in milligrams per liter
pb_rec_sus			Float	4	01050	Lead, suspended, recoverable, as Pb, in micrograms per liter
se_sus			Float	4	01146	Selenium, suspended, total, as Se, in micrograms per liter
soc			Float	4	00689	Carbon, organic, suspended, as C, in milligrams per liter
zn_rec_sus			Float	4	01091	Zinc, suspended, recoverable, as Zn, in micrograms per liter
bm_fdiam_002			Float	4	80294	Sediment, bed material, distilled-water fall diameter less than 0.002 millimeter, in percent
sbm_fdiam_004			Float	4	80157	Sediment, bed material, distilled-water fall diameter less than 0.004 millimeter, in percent
bm_fdiam_008			Float	4	80293	Sediment, bed material, distilled-water fall diameter less than 0.008 millimeter, in percent
bm_fdiam_016			Float	4	80282	Sediment, bed material, distilled-water fall diameter less than 0.016 millimeter, in percent
bm_fdiam_031			Float	4	80283	Sediment, bed material, distilled-water fall diameter less than 0.031 millimeter, in percent
sbm_fdiam_062			Float	4	80158	Sediment, bed material, distilled-water fall diameter less than 0.062 millimeter, in percent
sbm_fdiam_125			Float	4	80159	Sediment, bed material, distilled-water fall diameter less than 0.125 millimeter, in percent
sbm_fdiam_250			Float	4	80160	Sediment, bed material, distilled-water fall diameter less than 0.250 millimeter, in percent
sbm_fdiam_500			Float	4	80161	Sediment, bed material, distilled-water fall diameter less than 0.500 millimeter, in percent
sbm_fdiam_1			Float	4	80162	Sediment, bed material, distilled-water fall diameter less than 1.00 millimeter, in percent
sbm_sdiam_062			Float	4	80164	Sediment, bed material, sieve diameter less than 0.062 millimeter, in percent
sbm_sdiam_125			Float	4	80165	Sediment, bed material, sieve diameter less than 0.125 millimeter, in percent
sbm_sdiam_250			Float	4	80166	Sediment, bed material, sieve diameter less than 0.250 millimeter, in percent
sbm_sdiam_500			Float	4	80167	Sediment, bed material, sieve diameter less than 0.500 millimeter, in percent
sbm_sdiam_1			Float	4	80168	Sediment, bed material, sieve diameter less than 1.00 millimeter, in percent
sbm_sdiam_2			Float	4	80169	Sediment, bed material, sieve diameter less than 2.00 millimeters, in percent
sbm_sdiam_4			Float	4	80170	Sediment, bed material, sieve diameter less than 4.00 millimeters, in percent
sbm_sdiam_8			Float	4	80171	Sediment, bed material, sieve diameter less than 8.00 millimeters, in percent
sbm_sdiam_16			Float	4	80172	Sediment, bed material, sieve diameter less than 16.0 millimeters, in percent
sbm_sdiam_32			Float	4	80173	Sediment, bed material, sieve diameter less than 32.0 millimeters, in percent

sfdiam_002			Integer	2	70337	Sediment, suspended, distilled-water fall diameter less than 0.002 millimeter, in percent
sfdiam_004			Integer	2	70338	Sediment, suspended, distilled-water fall diameter less than 0.004 millimeter, in percent
sfdiam_008			Integer	2	70339	Sediment, suspended, distilled-water fall diameter less than 0.008 millimeter, in percent
sfdiam_016			Integer	2	70340	Sediment, suspended, distilled-water fall diameter less than 0.016 millimeter, in percent
sfdiam_031			Float	4	70341	Sediment, suspended, distilled-water fall diameter less than 0.031 millimeter, in percent
sfdiam_062			Integer	2	70342	Sediment, suspended, distilled-water fall diameter less than 0.062 millimeter, in percent
sfdiam_125			Integer	2	70343	Sediment, suspended, distilled-water fall diameter less than 0.125 millimeter, in percent
sfdiam_250			Integer	2	70344	Sediment, suspended, distilled-water fall diameter less than 0.250 millimeter, in percent
sfdiam_500			Integer	2	70345	Sediment, suspended, distilled-water fall diameter less than 0.500 millimeter, in percent
sfdiam_1			Integer	2	70346	Sediment, suspended, distilled-water fall diameter less than 1.00 millimeter, in percent
sfdiam_2			Float	4	70347	Sediment, suspended, distilled-water fall diameter less than 2.00 millimeters, in percent
ssdiam_lt062			Integer	2	70331	Sediment, suspended, sieve diameter less than 0.062 millimeter, in percent
ssdiam_lt125			Integer	2	70332	Sediment, suspended, sieve diameter less than 0.125 millimeter, in percent
ssdiam_lt250			Float	4	70333	Sediment, suspended, sieve diameter less than 0.250 millimeter, in percent
ssdiam_lt500			Float	4	70334	Sediment, suspended, sieve diameter less than 0.500 millimeter, in percent
ssdiam_lt1			Float	4	70335	Sediment, suspended, sieve diameter less than 1.00 millimeter, in percent
ss_conc_lt062			Float	4	80222	Sediment, suspended, concentration, sieve diameter less than 0.062 millimeter, in milligrams per liter
sed_t			Float	4	80180	Sediment, total, concentration, in milligrams per liter
sed_q			Float	4	80156	Sediment discharge, total, suspended plus bed material, in tons per day
sus_sed			Integer	2	80154	Sediment, suspended, concentration, in milligrams per liter
sus_sed_q			Float	4	80155	Sediment discharge, suspended, in tons per day

INORGBM table (stores data on inorganic constituents in bottom material)

site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
matrix	•	•	Char	2	—	Sample matrix
site			Varchar	9	—	Identifying name or number used in published report (table 1) and unique within study area covered by report. If different names for same site were used in reconnaissance- and detailed-investigation reports, both names are used and identifier from reconnaissance report is enclosed in parentheses.
prime_id			Varchar	8	—	Laboratory identifier used in original U.S. Geological Survey data reports (table 1)
qaqc	•	•	Char	1	—	Whether purpose of sample collection was quality assurance
fraction	•	•	Varchar	6	—	Size-fraction of sample material
ag_bm			Integer	2	—	Silver, total, in bottom material, as Ag, in micrograms per gram
al_bm			Float	4	—	Aluminum, total, in bottom material, as Al, in percent
as_bm			Float	4	—	Arsenic, in bottom material, as As, in micrograms per gram
au_bm			Integer	2	—	Gold, in bottom material, as Au, in micrograms per gram
b_xw_bm			Float	4	—	Boron, hot-water-extractable, in bottom material, as B, in micrograms per liter
ba_bm			Integer	2	—	Barium, total, in bottom material, as Ba, in micrograms per gram
be_bm			Integer	2	—	Beryllium, total, in bottom material, as Be, in micrograms per gram
bi_bm			Integer	2	—	Bismuth, total, in bottom material, as Bi, in micrograms per gram
c_co3_bm			Float	4	—	Carbon, carbonate, in bottom material, as C, in percent
c_org_bm			Float	4	—	Carbon, organic, in bottom material, as C, in percent
c_tot_bm			Float	4	—	Carbon, total, in bottom material, as C, in percent
ca_bm			Float	4	—	Calcium, recoverable from bottom material, as Ca, in percent
cd_bm			Integer	2	—	Cadmium, total, in bottom material, as Cd, in micrograms per gram
ce_bm			Integer	2	—	Cerium, total, in bottom material, as Ce, in micrograms per gram
co_bm			Integer	2	—	Cobalt, total, in bottom material, as Co, in micrograms per gram
cr_bm			Integer	2	—	Chromium, total, in bottom material, as Cr, in micrograms per gram
cu_bm			Integer	2	—	Copper, total, in bottom material, as Cu, in micrograms per gram

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
INORGBM table (stores data on inorganic constituents in bottom material)—*Continued*						
fe_bm			Float	4	01170	Iron, total, in bottom material, as Fe, in percent
ga_bm			Integer	2	—	Gallium, total, in bottom material, as Ga, in micrograms per gram
hg_bm			Float	4	71921	Mercury, in bottom material, as Hg, in micrograms per gram
k_bm			Float	4	00938	Potassium, in bottom material, as K, in percent
la_bm			Integer	2	—	Lanthanum, total, in bottom material, as La, in micrograms per gram
li_bm			Integer	2	01133	Lithium, in bottom material, as Li, in micrograms per gram
mg_bm			Float	4	00924	Magnesium, in bottom material, as Mg, in percent
mn_bm			Integer	2	01053	Manganese, total, in bottom material, as Mn, in micrograms per gram
mo_bm			Integer	2	01063	Molybdenum, total, in bottom material, as Mo, in micrograms per gram
na_bm			Float	4	00934	Sodium, in bottom material, as Na, in percent
nb_bm			Integer	2	—	Niobium, total, in bottom material, as Nb, in micrograms per gram
nd_bm			Integer	2	—	Neodymium, total, in bottom material, as Nd, in micrograms per gram
ni_bm			Integer	2	01068	Nickel, total, in bottom material, as Ni, in micrograms per gram
p_bm			Float	4	00668	Phosphorus, total, in bottom material, as P, in percent
pb_bm			Integer	2	01052	Lead, total, in bottom material, as Pb, in micrograms per gram
sc_bm			Integer	2	82317	Scandium, total, in bottom material, as Sc, in micrograms per gram
se_bm			Float	4	01148	Selenium, total, in bottom material, as Se, in micrograms per gram
sr_bm			Integer	2	01083	Strontium, total, in bottom material, as Sr, in micrograms per gram
th_bm			Integer	2	82313	Thorium, total, in bottom material, as Th, in micrograms per kilogram
ti_bm			Float	4	01153	Titanium, total, in bottom material, as Ti, in micrograms per gram
u_bm			Float	4	22707	Uranium, natural, total, in bottom material, as U, in micrograms per gram
v_bm			Integer	2	01088	Vanadium, total, in bottom material, as V, in micrograms per gram
y_bm			Integer	2	—	Yttrium, total, in bottom material, as Y, in micrograms per gram
yb_bm			Integer	2	82311	Ytterbium, total, in bottom material, as Yb, in micrograms per kilogram
zn_bm			Integer	2	01093	Zinc, total, in bottom material, as Zn, in micrograms per gram
ORGBM table (stores data on organic chemicals and nitrogen in bottom material)						
site_id	•		Varchar	15	—	Unique 9- or 15-digit identifying number assigned on basis of geographic location
samp_date	•		Date	—	—	Date of sample collection (*dd–mmm–yy* format)
samp_time	•		Integer	2	—	Time of sample collection (*hhmm* format)
matrix	•	•	Char	2	—	Sample matrix
acenaphthen_bm			Float	4	34208	Acenaphthene, in bottom material, in micrograms per kilogram
acenaphthyl_bm			Float	4	34203	Acenaphthylene, in bottom material, in micrograms per kilogram
aldrin_bm			Float	4	39333	Aldrin, in bottom material, dry weight, in micrograms per kilogram
anthracene_bm			Float	4	34223	Anthracene, in bottom material, in micrograms per kilogram

b2ethxphth_bm	Float	4	39102	Bis(2-ethylhexyl) phthalate, in bottom material, in micrograms per kilogram
benzapyren_bm	Float	4	34250	Benzo(a)pyrene, total, in bottom material, in micrograms per kilogram
benzbflrant_bm	Float	4	34233	Benzo(b)fluoranthene, total, in bottom material, in micrograms per kilogram
benzkflrant_bm	Float	4	34245	Benzo(k)fluoranthene, total, in bottom material, in micrograms per kilogram
benzperyln_bm	Float	4	34524	Benzo(g,h,i) perylene(1,12-Benzoperylene), in bottom material, in micrograms per kilogram
bis2cleth_e_bm	Float	4	34276	Bis(2-chloroethyl) ether, in bottom material, in micrograms per kilogram
bis2cleth_m_bm	Float	4	34281	Bis(2-chloroethoxy) methane, in bottom material, in micrograms per kilogram
bis2cliso_e_bm	Float	4	34286	Bis(2-chloroisopropyl) ether, in bottom material, in micrograms per kilogram
brphphethr_bm	Float	4	34639	4-Bromophenyl phenyl ether, in bottom material, in micrograms per kilogram
c_inorg_bm	Float	4	00686	Carbon, inorganic, in bottom material, as C, in grams per kilogram
c_org_bm	Float	4	30243	Carbon, organic, in bottom material, as C, in percent
c_org_t_bm	Float	4	00687	Carbon, organic, total, in bottom material, as C, dry weight, in grams per kilogram
c_tot_bm	Float	4	00693	Carbon, inorganic plus organic, total, in bottom material, as C, dry weight, in grams per kilogram
chlordane_bm	Float	4	39351	Chlordane, technical, in bottom material, dry weight, in micrograms per kilogram
chrysene_bm	Float	4	34323	Chrysene, in bottom material, in micrograms per kilogram
clnaphthal_bm	Float	4	34584	2-Chloronaphthalene, in bottom material, in micrograms per kilogram
clphenol_bm	Float	4	34589	2-Chlorophenol, in bottom material, in micrograms per kilogram
d24_bm	Float	4	39731	2,4-Dichlorophenoxyacetic acid, in bottom material, dry weight, in micrograms per kilogram
ddd_bm	Float	4	39363	Dichloro-diphenyl-dichloroethane (DDD), in bottom material, in micrograms per kilogram
dde_bm	Float	4	39368	Dichloro-diphenyl-dichloroethylene (DDE), in bottom material, in micrograms per kilogram
ddt_bm	Float	4	39373	Dichloro-diphenyl-trichloroethane (DDT), in bottom material, in micrograms per kilogram
diazinon_bm	Float	4	39571	Diazinon, in bottom material, dry weight, in micrograms per kilogram
dibenzanthr_bm	Float	4	34559	1,1,5,6-Dibenzanthracene, in bottom material, in micrograms per kilogram
dicamba_bm	Float	4	38931	Dicamba, in bottom material, dry weight, in micrograms per kilogram
diclbenz12_bm	Float	4	34539	1,2-Dichlorobenzene, in bottom material, in micrograms per kilogram
diclbenz13_bm	Float	4	34569	1,3-Dichlorobenzene, in bottom material, in micrograms per kilogram
diclbenz14_bm	Float	4	34574	1,4-Dichlorobenzene, in bottom material, in micrograms per kilogram
diclphenol_bm	Float	4	34604	2,4-Dichlorophenol, in bottom material, in micrograms per kilogram
dieldrin_bm	Float	4	39383	Dieldrin, in bottom material, dry weight, in micrograms per kilogram
dietpthlate_bm	Float	4	34339	Diethyl phthalate, in bottom material, in micrograms per kilogram
dimephtlate_bm	Float	4	34344	Dimethyl phthalate in bottom material, in micrograms per kilogram
dimthphenl_bm	Float	4	34609	2,4-Dichlorprop, in bottom material, in micrograms per kilogram
dinocresol_bm	Float	4	34660	4,6-Dinitro-orthocresol, in bottom material, in micrograms per kilogram
dinphenol_bm	Float	4	34619	2,4-Dinitrophenol, in bottom material, in micrograms per kilogram
dintolu24_bm	Float	4	34614	2,4-Dinitro-toluene, in bottom material, in micrograms per kilogram
dintolu26_bm	Float	4	34629	2,6-Dinitro-toluene, in bottom material, in micrograms per kilogram
dioctphthl_bm	Float	4	34599	Di-n-octyl phthalate, in bottom material, in micrograms per kilogram
dnb_phtha_bm	Float	4	39112	Di-n-butyl phthalate, in bottom material, in micrograms per kilogram
endosulf_bm	Float	4	39389	Endosulfan, in bottom material, dry weight, in micrograms per kilogram
endrin_bm	Float	4	39393	Endrin, in bottom material, dry weight, in micrograms per kilogram
ethion_bm	Float	4	39399	Ethion, in bottom material, dry weight, in micrograms per kilogram
flranthene_bm	Float	4	34379	Fluoranthene, in bottom material, in micrograms per kilogram
fluorene_bm	Float	4	34384	Fluorene, in bottom material, in micrograms per kilogram

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
ORGBM table (stores data on organic chemicals and nitrogen in bottom material)—*Continued*						
hcb_bm			Float	4	39701	Hexachlorobenzene, in bottom material, dry weight, in micrograms per kilogram
heptchlr_bm			Float	4	39413	Heptachlor, in bottom material, dry weight, in micrograms per kilogram
heptepox_bm			Float	4	39423	Heptachlor epoxide, in bottom material, dry weight, in micrograms per kilogram
hexclbutdie_bm			Float	4	39705	Hexachlorobutadiene, in bottom material, in micrograms per kilogram
hexclcyclpd_bm			Float	4	34389	Hexachlorocyclopentadiene, in bottom material, in micrograms per kilogram
hexclethan_bm			Float	4	34399	Hexachloroethane, in bottom material, in micrograms per kilogram
ind_pyr_bm			Float	4	34406	Indeno (1,2,3-cd) pyrene, in bottom material, in micrograms per kilogram
isphrone_bm			Float	4	34411	Isophorone, in bottom material, in micrograms per kilogram
lindane_bm			Float	4	39343	Gamma-benzene hexachloride (lindane), in bottom material, dry weight, in micrograms per kilogram
malathion_bm			Float	4	39531	Malathion, in bottom material, dry weight, in micrograms per kilogram
methoxchlr_bm			Float	4	39481	Methoxychlor, in bottom material, dry weight, in micrograms per kilogram
mirex_bm			Float	4	39758	Mirex, in bottom material, dry weight, in micrograms per kilogram
mparathion_bm			Float	4	39601	Methyl parathion, in bottom material, dry weight, in micrograms per kilogram
mtrithion_bm			Float	4	39791	Methyl trithion, in bottom material, dry weight, in micrograms per kilogram
naphthalen_bm			Float	4	34445	Naphthalene, in bottom material, in micrograms per kilogram
nbb_phth_bm			Float	4	34295	N-Butylbenzyl phthalate, in bottom material, in micrograms per kilogram
nh3org_t_bm			Float	4	00626	Nitrogen, ammonia plus organic, total, in bottom material, as N, dry weight, in milligrams per kilogram
nh3_t_bm			Float	4	00611	Nitrogen, ammonia, total, in bottom material, as N, dry weight, in milligrams per kilogram
no2no3_t_bm			Float	4	00633	Nitrogen, nitrite plus nitrate, total, in bottom material, as N, dry weight, in milligrams per kilogram
nitrobenzen_bm			Float	4	34450	Nitrobenzene, in bottom material, in micrograms per kilogram
nitrphenol2_bm			Float	4	34594	2-Nitrophenol, in bottom material, in micrograms per kilogram
nitrphenol4_bm			Float	4	34649	4-Nitrophenol, in bottom material, in micrograms per kilogram
nsodiphynyl_bm			Float	4	34436	N-Nitrosodiphenylamine, in bottom material, in micrograms per kilogram
parathion_bm			Float	4	39541	Parathion, dry weight, in bottom material, in micrograms per kilogram
pcb_bm			Float	4	39519	Polychlorinated biphenyls, in bottom material, dry weight, in micrograms per kilogram
pclmcresol_bm			Float	4	34455	Parachlorometacresol, in bottom material, in micrograms per kilogram
pclphenol_bm			Float	4	39061	Pentachlorophenol, in bottom material, in micrograms per kilogram
pcn_bm			Float	4	39251	Naphthalenes, polychlorinated, in bottom material, dry weight, in micrograms per kilogram
perthane_bm			Float	4	81886	Perthane, in bottom material, in micrograms per kilogram
phenol_bm			Float	4	34695	Phenol (C_6H_5OH), in bottom material, in micrograms per kilogram
phnanthren_bm			Float	4	34464	Phenanthrene, in bottom material, in micrograms per kilogram
picloram_bm			Float	4	38930	Picloram, in bottom material, dry weight, in micrograms per kilogram
pyrene_bm			Float	4	34472	Pyrene, in bottom material, in micrograms per kilogram
silvex_bm			Float	4	39761	Silvex, in bottom material, dry weight, in micrograms per kilogram
t245_bm			Float	4	39741	2,4,5-Trichlorophenoxyacetic acid, in bottom material, dry weight, in micrograms per kilogram
toxaphene_bm			Float	4	39403	Toxaphene, in bottom material, dry weight, in micrograms per kilogram
triclbenze_bm			Float	4	34554	1,2,4-Trichlorobenzene, in bottom material, in micrograms per kilogram
triclphenl_bm			Float	4	34624	2,4,6-Trichlorophenol, in bottom material, in micrograms per kilogram
trithion_bm			Float	4	39787	Trithion, in bottom material, dry weight, in micrograms per kilogram

INORGBIO table (stores data on sample matrix and inorganic constituents in biotic samples)

site_id	•		Varchar	15	—	Identification for nearest appropriate site where surface-water samples were collected. Blank indicates no match between biological-sampling location and water-sampling site.
area	•	•	Varchar	10	—	Abbreviated name identifying NIWQP study area
subarea	•	•	Varchar	10	—	Abbreviated name identifying subarea within NIWQP study area
location			Varchar	64	—	Biologist-designated sampling location within study area
category		•	Char	17	—	Broad taxonomic category of sample, such as plant or bird
species			Varchar	35	—	Standardized common name of organism used in NIWQP data base (see section on TAXON table, this appendix).
samp_date			Date	—	—	Date of sample collection (*mm/dd/yy* format)
year			Varchar	7	—	Last two digits of year sample was collected (00–99, of 1900's)
month			Integer	2	—	Month sample was collected (01–12)
day			Integer	2	—	Day sample was collected (unknown if missing)
compos_n			Float	4	—	Number of individuals in composite sample
life_stage			Varchar	16	—	Life stage of sample (for example, juvenile) if appropriate
tissue			Varchar	20	—	Tissue analyzed (for example, liver, whole body)
moisture			Float	4	—	Moisture content of sample, in percent
ag_bio			Float	4	—	Silver, in biological material, as Ag, dry weight, in micrograms per gram
al_bio			Float	4	—	Aluminum, in biological material, as Al, dry weight, in micrograms per gram
as_bio			Float	4	—	Arsenic, in biological material, as As, dry weight, in micrograms per gram
b_bio			Float	4	—	Boron, in biological material, as B, dry weight, in micrograms per gram
ba_bio			Float	4	—	Barium, in biological material, as Ba, dry weight, in micrograms per gram
be_bio			Float	4	—	Beryllium, in biological material, as Be, dry weight, in micrograms per gram
cd_bio			Float	4	—	Cadmium, in biological material, as Cd, dry weight, in micrograms per gram
co_bio			Float	4	—	Cobalt, in biological material, as Co, dry weight, in micrograms per gram
cr_bio			Float	4	—	Chromium, in biological material, as Cr, dry weight, in micrograms per gram
cu_bio			Float	4	—	Copper, in biological material, as Cu, dry weight, in micrograms per gram
fe_bio			Float	4	—	Iron, in biological material, as Fe, dry weight, in micrograms per gram
hg_bio			Float	4	—	Mercury, in biological material, as Hg, dry weight, in micrograms per gram
mg_bio			Float	4	—	Magnesium, in biological material, as Mg, dry weight, in micrograms per gram
mn_bio			Float	4	—	Manganese, in biological material, as Mn, dry weight, in micrograms per gram
mo_bio			Float	4	—	Molybdenum, in biological material, as Mo, dry weight, in micrograms per gram
ni_bio			Float	4	—	Nickel, in biological material, as Ni, dry weight, in micrograms per gram
pb_bio			Float	4	—	Lead, in biological material, as Pb, dry weight, in micrograms per gram
sb_bio			Float	4	—	Antimony, in biological material, as Sb, dry weight, in micrograms per gram
se_bio			Float	4	—	Selenium, in biological material, as Se, dry weight, in micrograms per gram
sn_bio			Float	4	—	Tin, in biological material, as Sn, dry weight, in micrograms per gram
sr_bio			Float	4	—	Strontium, in biological material, as Sr, dry weight, in micrograms per gram
tl_bio			Float	4	—	Thallium, in biological material, as Tl, dry weight, in micrograms per gram
v_bio			Float	4	—	Vanadium, in biological material, as V, dry weight, in micrograms per gram
zn_bio			Float	4	—	Zinc, in biological material, as Zn, dry weight, in micrograms per gram

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

Attribute name	Attribute characteristics				NWIS parameter code	Attribute description
	Linking	Fixed value	Data type	Field length		
ORGBIO table (stores data on sample matrix and organic chemicals in biotic samples)						
site_id	•		Varchar	15	—	Identification for nearest appropriate site where surface-water samples were collected. Blank indicates no match between biological-sampling location and water-sampling site.
area	•	•	Varchar	10	—	Abbreviated name identifying NIWQP study area
subarea	•	•	Varchar	10	—	Abbreviated name identifying subarea within NIWQP study area
location			Varchar	30	—	Biologist-designated sampling location within study area
category		•	Char	10	—	Broad taxonomic category of sample, such as plant, or bird
species			Varchar	30	—	Standardized common name of organism used in NIWQP data base (see section on TAXON table, this appendix)
samp_date			Date	—	—	Date of sample collection (*mm/dd/yy* format)
year			Varchar	7	—	Last two digits of year sample was collected (00–99, of 1900's)
month			Integer	2	—	Numeric value for month sample was collected
day			Integer	2	—	Day sample was collected (unknown if missing)
compos_n			Float	4	—	Number of individuals in composite sample
life_stage			Varchar	30	—	Life stage of sample (for example, juvenile) if appropriate
tissue			Varchar	30	—	Tissue analyzed (for example, liver, whole body)
moisture			Float	4	—	Moisture content of sample, in percent
lipid			Float	4	—	Lipid content of sample, in percent
acenaphthe_bio			Float	4	—	Acenaphthene, in biological material, wet weight, in micrograms per gram
acenaphthy_bio			Float	4	—	Acenaphthylene, in biological material, wet weight, in micrograms per gram
aldrin_bio			Float	4	—	Aldrin, in biological material, wet weight, in micrograms per gram
anthracene_bio			Float	4	—	Anthracene, in biological material, wet weight, in micrograms per gram
archlr1248_bio			Float	4	—	Arochlor 1248, in biological material, wet weight, in micrograms per gram
archlr1254_bio			Float	4	—	Arochlor 1254, in biological material, wet weight, in micrograms per gram
archlr1260_bio			Float	4	—	Arochlor 1260, in biological material, wet weight, in micrograms per gram
benzaanthr_bio			Float	4	—	Benzo(a)anthracene, in biological material, wet weight, in micrograms per gram
benzbflran_bio			Float	4	—	Benzo(b)fluoranthene, in biological material, wet weight, in micrograms per gram
benzkflran_bio			Float	4	—	Benzo(k)fluoranthene, in biological material, wet weight, in micrograms per gram
benzoapyre_bio			Float	4	—	Benzo(a)pyrene, in biological material, wet weight, in micrograms per gram
benzoepyre_bio			Float	4	—	Benzo(e)pyrene, in biological material, wet weight, in micrograms per gram
benzperyln_bio			Float	4	—	Benzo(ghi)perylene, in biological material, wet weight, in micrograms per gram
bhc_alpha_bio			Float	4	—	Alpha-benzene hexachloride, in biological material, wet weight, in micrograms per gram
bhc_beta_bio			Float	4	—	Beta-benzene hexachloride, in biological material, wet weight, in micrograms per gram
bhc_delta_bio			Float	4	—	Delta-benzene hexachloride, in biological material, wet weight, in micrograms per gram
bhc_gamma_bio			Float	4	—	Gamma-benzene hexachloride (lindane), in biological material, wet weight, in micrograms per gram
bhc_total_bio			Float	4	—	Benzene hexachloride, total, in biological material, wet weight, in micrograms per gram
chlord_bio			Float	4	—	Chlordane, in biological material, wet weight, in micrograms per gram
chlord_a_bio			Float	4	—	Alpha chlordane (cis-Chlordane), in biological material, wet weight, in micrograms per gram
chlord_g_bio			Float	4	—	Gamma chlordane (trans-Chlordane), in biological material, wet weight, in micrograms per gram
chrysene_bio			Float	4	—	Chrysene, in biological material, wet weight, in micrograms per gram

ddmu_bio	Float	4	—	1,1' (Chloroethenylidene)bis(4-chlorobenzene) (DDMU) in biological material, wet weight, in micrograms per gram
dcpa_bio	Float	4	—	Dacthal, in biological material, wet weight, in micrograms per gram
ddd_op_bio	Float	4	—	O-p-Dichloro-diphenyl-dichloroethane (DDD), in biological material, wet weight, in micrograms per gram.
ddd_pp_bio	Float	4	—	P-p' dichloro-diphenyl-dichloroethane (DDD), in biological material, wet weight, in micrograms per gram.
dde_op_bio	Float	4	—	O-p dichloro-diphenyl-dichloroethylene (DDE), in biological material, wet weight, in micrograms per gram.
dde_pp_bio	Float	4	—	O-p' dichloro-diphenyl-dichloroethylene (DDE), in biological material, wet weight, in micrograms per gram.
ddt_op_bio	Float	4	—	O-p dichloro-diphenyl-trichloroethane (DDT), in biological material, wet weight, in micrograms per gram.
ddt_pp_bio	Float	4	—	P-p' dichloro-diphenyl-trichloroethane (DDT), in biological material, wet weight, in micrograms per gram.
dibenzanth_bio	Float	4	—	1,1,5,6-Dibenzanthracene, in biological material, wet weight, in micrograms per gram
dieldrin_bio	Float	4	—	Dieldrin, in biological material, wet weight, in micrograms per gram
dimethnaph_bio	Float	4	—	Dimethylnaphthalene, in biological material, wet weight, in micrograms per gram
endosulf_1_bio	Float	4	—	Endosulfan I, in biological material, wet weight, in micrograms per gram
endosulf_2_bio	Float	4	—	Endosulfan II, in biological material, wet weight, in micrograms per gram
endosulf_s_bio	Float	4	—	Endosulfan sulfate, in biological material, wet weight, in micrograms per gram
endrin_bio	Float	4	—	Endrin, in biological material, wet weight, in micrograms per gram
flranthene_bio	Float	4	—	Fluoranthene, in biological material, wet weight, in micrograms per gram
fluorene_bio	Float	4	—	Fluorene, in biological material, wet weight, in micrograms per gram
hcb_bio	Float	4	—	Hexachlorobenzene, in biological material, wet weight, in micrograms per gram
heptepox_bio	Float	4	—	Heptachlor epoxide, in biological material, wet weight, in micrograms per gram
ind_pyr_bio	Float	4	—	Indeno (1,2,3-cd) pyrene, in biological material, wet weight, in micrograms per gram
methnaphth_bio	Float	4	—	Methylnaphthalene, in biological material, wet weight, in micrograms per gram
methoxchlr_bio	Float	4	—	Methoxychlor, in biological material, wet weight, in micrograms per gram
mirex_bio	Float	4	—	Mirex, in biological material, wet weight, in micrograms per gram
naphthalen_bio	Float	4		Naphthalene, in biological material, wet weight, in micrograms per gram
nonachlr_c_bio	Float	4	—	Cis-nonachlor, in biological material, wet weight, in micrograms per gram
nonachlr_t_bio	Float	4	—	Trans-nonachlor, in biological material, wet weight, in micrograms per gram
oxychlor_bio	Float	4	—	Oxychlordane, in biological material, wet weight, in micrograms per gram
pcb_tot_bio	Float	4	—	Polychlorinated biphyenyls, total, in biological material, wet weight, in micrograms per gram
perylene_bio	Float	4	—	Perylene, in biological material, wet weight, in micrograms per gram
phnanthren_bio	Float	4	—	Phenanthrene, in biological material, wet weight, in micrograms per gram
pyrene_bio	Float	4	—	Pyrene, in biological material, wet weight, in micrograms per gram
toxaphene_bio	Float	4	—	Toxaphene, in biological material, wet weight, in micrograms per gram
trimethnap_bio	Float	4	—	Trimethylnaphthalene, in biological material, wet weight, in micrograms per gram

TAXON table (stores data on taxonomy)

category	Varchar	17	—	Broad taxonomic category of sample, such as plant or bird
id_level	Varchar	35	—	Lowest taxonomic level for which classification is known (genus, family, class, or kingdom)
common_name	Varchar	49	—	Common name for organism; typically same as attribute “niwqp_name”
latin_name	Varchar	38	—	Latin binomial for organism where known. Higher level classification given if species unknown
niwqp_name	Varchar	49	—	Organism name used in NIWQP data base; same as attribute “species” in tables INORGBIO and ORGBIO

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*

Code or value	Explanation
	Attribute "agyanal" (used in FIELD table)
PRIV	Water sample analyzed by private laboratory
USGS	Water sample analyzed by U.S. Geological Survey
WYDOA	Water sample analyzed by Wyoming Department of Agriculture
	Attribute "agycol" (used in FIELD table)
USGS	Water sample collected by U.S. Geological Survey
SDWRI	Water sample collected by South Dakota Water Resources Institute
	Attribute "area" (used in AREA, SITE, INORGBIO, and ORGBIO tables)
AMFALLS	American Falls Reservoir, Idaho
ANGOSTURA	Angostura Reclamation Unit, South Dakota
BELLE	Belle Fourche Reclamation Project, South Dakota
COLUMBIA	Columbia River Basin, Washington
DOLORES	Dolores–Ute Mountain area, Colorado
GUNNISON	Gunnison River Basin–Grand Valley Project, Colorado
HUMBOLDT	Humboldt River area, Nevada
KENDRICK	Kendrick Reclamation Project, Wyoming
KLAMATH	Klamath Basin Refuge Complex, California–Oregon
LOWERCOLO	Lower Colorado River valley, California–Arizona
LOWERRIO	Lower Rio Grande valley, Texas
MALHEUR	Malheur National Wildlife Refuge, Oregon
MIDARK	Middle Arkansas River Basin, Colorado–Kansas
MIDGREEN	Middle Green River Basin, Utah
MIDDLERIO	Middle Rio Grande, New Mexico
MILK	Milk River Basin, Montana
OWYHEE	Owyhee–Vale Reclamation Project areas, Oregon–Idaho
PINE	Pine River area, Colorado
RIVERTON	Riverton Reclamation Project, Wyoming
SACRAMENTO	Sacramento Refuge Complex, California
SALTON	Salton Sea area, California
SANJUAN	San Juan River area, New Mexico
STILLWATER	Stillwater Wildlife Management Area, Nevada
SUNRIVER	Sun River area, Montana
TULARE	Tulare Lake Bed area, California
VERMEJO	Vermejo Project area, New Mexico
	Attribute "background" (used in SITE table)
C	Contaminated: Site is either within or downgradient from irrigated areas within study area
R	Reference: Site is upgradient from irrigated areas within study area
	Attribute "basin" (used in AREA table)
O	Open: Lakes in study area are flowthrough
M	Mixed: Some lakes in study area are terminal, and others are flowthrough
C	Closed: Lakes in study area are terminal
	Attribute "category" (used in INORGBIO, ORGBIO, and TAXON tables)
AMPHIBIAN	Amphibian
BIRD	Bird
FISH	Fish
INVERTEBRATE	Invertebrate
MAMMAL	Mammal
PLANKTON	Plankton
PLANT	Plant
REPTILE	Reptile

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*—Continued

Code or value	Explanation
	Attribute "doi" (used in FIELD table)
Y	Yes: Sample was collected as part of NIWQP investigation
N	No: Sample was not collected as part of NIWQP investigation
	Attribute "fraction" (used in INORGBM table)
<2.0	Bottom material of particle size less than 2 millimeters
<0.062	Bottom material of particle size less than 0.062 millimeter
	Attribute "geology" (used in AREA table; same codes as for "sitegeology"; listed generally in age order; units modified after King and Beikman, 1974)
	Quaternary volcanic and sedimentary deposits:
Q	Stratified sedimentary deposits
QV	Volcanic rocks
	Tertiary volcanic and sedimentary deposits:
TPV	Nonfelsic volcanic rocks (Pliocene)
TPC	Continental sedimentary deposits (Pliocene)
TMF	Felsic volcanic rocks (Miocene)
TMV	Nonfelsic volcanic rocks (Miocene)
TEC	Continental sedimentary deposits (Eocene)
TXC	Continental sedimentary deposits (Paleocene)
	Upper Cretaceous stratified, mainly marine, sedimentary rocks:
UK	Undivided (includes Tuscaloosa, Woodbine, Eagle Ford, Austin, Taylor, and Navarro Groups; locally includes Lower Cretaceous rocks not mapped separately).
UK4	Navarro Group
UK3, UK3A	Taylor Group
UK2	Austin and Eagle Ford Groups, undivided
UK1	Woodbine and Tuscaloosa Groups, undivided (locally includes Lower Cretaceous rocks not mapped separately)
UPZ	Upper Paleozoic stratified, mainly marine, sedimentary rocks
	Early Proterozoic metamorphic and igneous rocks:
XG	Plutonic and intrusive granitic rocks
XM	Orthogneiss and paragneiss
	Attribute "matrix" (used in FIELD, INORG, ISOTOPE, NUTRIENT, ORG, SEDIMENT, INORGBM, and ORGBM tables)
BC	Borehole coring
BM	Bottom material
GW	Ground water
IW	Interstitial water
SC	Salt crust
SO	Soil
SS	Suspended sediment
SW	Surface water
	Attribute "mining" (used in AREA table)
Y	Yes: Mining activities are reported for study area
N	No: Mining activities are not reported for study area
	Attribute "pesticides" (used in AREA table)
Y	Yes: Heavy pesticide use is reported for study area
N	No: Heavy pesticide use is not reported for study area
	Attribute "qaqc" (used in FIELD and INORGBM tables)
Y	Yes: Sample was collected and(or) analyzed for quality-assurance purposes
N	No: Sample was not collected and(or) analyzed specifically for quality-assurance purposes but for routine environmental monitoring

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*—Continued

Code or value	Explanation
	Attribute "samp_meth" (used in FIELD table)
EDI	Equal-discharge increment
ETR	Equal transit rate (integrated discharge)
EWI	Equal-width increment
GRAB	Grab (dip)
MVERT	Multiple vertical
OTB	Open-top bailer
SQZ	Squeeze pump
SUBM	Submersible pump
SVERT	Single vertical
THIEF	Thief
VDORN	Van Dorn
WB	Weighted bottle
OTHER	Method other than those listed above
	Attribute "sitegeology" (used in SITE table; same codes as for "geology"; listed generally in age order; units modified after King and Beikman, 1974)
	Quaternary volcanic and sedimentary deposits:
Q	Stratified sedimentary deposits
QV	Volcanic rocks
	Tertiary volcanic and sedimentary deposits:
TPV	Nonfelsic volcanic rocks (Pliocene)
TPC	Continental sedimentary deposits (Pliocene)
TMF	Felsic volcanic rocks (Miocene)
TMV	Nonfelsic volcanic rocks (Miocene)
TEC	Continental sedimentary deposits (Eocene)
TXC	Continental sedimentary deposits (Paleocene)
	Upper Cretaceous stratified, mainly marine, sedimentary rocks:
UK	Undivided (includes Tuscaloosa, Woodbine, Eagle Ford, Austin, Taylor, and Navarro Groups; locally includes Lower Cretaceous rocks not mapped separately).
UK4	Navarro Group
UK3, UK3A	Taylor Group
UK2	Austin and Eagle Ford Groups, undivided
UK1	Woodbine and Tuscaloosa Groups, undivided (locally includes Lower Cretaceous rocks not mapped separately)
UPZ	Upper Paleozoic stratified, mainly marine, sedimentary rocks
	Early Proterozoic metamorphic and igneous rocks:
XG	Plutonic and intrusive granitic rocks
XM	Orthogneiss and paragneiss
	Attribute "site_type" (used in SITE table)
DR	Drain
GW	Ground water
LK	Lake or pond
SP	Spring
SW	Surface water
	Attribute "source" (used in SITE table)
Y	Yes: Site represents source water for irrigation
N	No: Site does not represent source water for irrigation

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*—Continued

Code or value	Explanation
	Attribute "sub_area" (used in AREA, SITE, INORGBIO, AND ORGBIO tables; study-area name precedes colon)
AMFALLS	American Falls Reservoir, Idaho (no subarea)
ANGOSTURA	Angostura Reclamation Unit, South Dakota (no subarea)
BELLE	Belle Fourche Reclamation Project, South Dakota (no subarea)
COLUMBIA	Columbia River Basin, Washington (no subarea)
DOLORES	Dolores–Ute Mountain area, Colorado (no subarea)
GRANDVALLE	Grand Valley subarea of Gunnison River Basin–Grand Valley Project, Colorado
UNCOMPAHGR	Uncompahgre Project subarea of Gunnison River Basin–Grand Valley Project, Colorado
HUMBOLDT	Humboldt River area, Nevada (no subarea)
KENDRICK	Kendrick Reclamation Project, Wyoming (no subarea)
KLAMATH	Klamath Basin Refuge Complex, California–Oregon (no subarea)
LOWERCOLO	Lower Colorado River valley, California–Arizona (no subarea)
LOWERRIO	Lower Rio Grande valley, Texas (no subarea)
MALHEUR	Malheur National Wildlife Refuge, Oregon (no subarea)
MIDARK	Middle Arkansas River Basin, Colorado–Kansas (no subarea)
OURAY	Ouray subarea of Middle Green River Basin, Utah
PARIETTE	Pariette subarea of Middle Green River Basin, Utah
STEWART	Stewart subarea of Middle Green River Basin, Utah
MIDDLERIO	Middle Rio Grande, New Mexico (no subarea)
MILK	Milk River Basin, Montana (no subarea)
OWYHEE	Owyhee–Vale Reclamation Project areas, Oregon–Idaho (no subarea)
PINE	Pine River area, Colorado (no subarea)
RIVERTON	Riverton Reclamation Project, Wyoming (no subarea)
SACDELCOL	Sacramento, Delevan, and Colusa National Wildlife Refuges in Sacramento Refuge Complex, California
BUTTESUTTE	Butte Sink National Wildlife Management Area and Sutter National Wildlife Refuge in Sacramento Refuge Complex, California
SALTON	Salton Sea area, California (no subarea)
SANJUAN	San Juan River area, New Mexico (no subarea)
CARSONLAKE	Carson Lake subarea of Stillwater Wildlife Management Area, Nevada
FERNLEY	Fernley subarea of Stillwater Wildlife Management Area, Nevada
MASSIE	Massie Slough subarea of Stillwater Wildlife Management Area, Nevada
STILLWATER	Stillwater subarea of Stillwater Wildlife Management Area, Nevada
BENTONLAKE	Benton Lake National Wildlife Refuge in Sun River area, Montana
FREEZOUT	Freezout Lake National Wildlife Refuge in Sun River area, Montana
GREENFIELD	Greenfield Irrigation Division subarea of Sun River area, Montana
TULARE	Tulare Lake Bed area, California (no subarea)
VERMEJO	Vermejo Project area, New Mexico (no subarea)